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PRACTICAL OBSERVATIONS
ON
THE TREATMENT
OF
ULCERS ON THE LEGS.

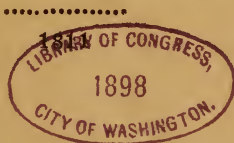
PRACTICAL OBSERVATIONS
ON
THE TREATMENT
OF
ULCERS ON THE LEGS,
CONSIDERED AS
A BRANCH OF MILITARY SURGERY.
TO WHICH ARE ADDED,
SOME OBSERVATIONS
ON VARICOSE VEINS, AND PILES.

FIRST AMERICAN EDITION.

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TO HIS ROYAL HIGHNESS
FREDERICK,
DUKE OF YORK AND ALBANY,
FIELD MARSHAL AND COMMANDER IN CHIEF OF
HIS MAJESTY'S FORCES.

SIR,

No surgical complaint, incident to the soldier, has deprived his Majesty's service of so many men as that of ulcers on the legs ; it is therefore a disease, the effects of which your Royal Highness, in considering the military resources of the country, must always have seen with regret.

From viewing the subject in this light, I have presumed to lay before your Royal Highness the following pages ; in which an attempt

is made to diminish an evil so destructive to the effective strength of the army. I am the more encouraged to address them to your Royal Highness from having experienced, while under your royal Highness's command upon the Continent, a ready compliance with every arrangement that was suggested for the relief of the soldier, accompanied with an earnest solicitude for his welfare.

A great part of my experience on this subject, has been acquired in Military hospitals, and I now communicate my observations to the Public, from a desire to be of use in this the most common and necessary branch of Military Surgery.

The present work, I hope, will not be considered as unworthy of your Royal Highness's protection, the honourable sanction of whose name will show, that whatever may be its imperfections, the subject of it has attracted the notice of your Royal Highness, and therefore is highly deserving of the consideration of the General and Field Officers of the Army.

The support it may receive from the Commanding Officers of Regiments, excited by your Royal Highness's example, will also be the means of its engaging the study and attention of every military surgeon.

I have the honour to be,
with the greatest respect,

SIR,

your Royal Highness's devoted
and most obedient

humble servant

EVERARD HOME.

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INTRODUCTION.

WHEN we consider the number of recruits who are rejected, and the number of well disciplined men who are discharged from the army on account of ulcers on the legs, it must appear to be one of the most important duties of every military surgeon, to pay particular attention to a complaint, which renders so many men unfit to perform the duties of soldiers.

It has been unpropitious to the improvement of the treatment of ulcers on the legs, that they have been universally admitted to be the most unmanageable cases which become the objects of surgery; that they are

cases in which the most eminent surgeons are too often known to fail in performing a cure ; and, therefore, bring no imputation of want of skill upon those practitioners who happen to prove unsuccessful.

This has led the younger part of the profession in the army to be too diffident of their own abilities ; to despair of success where so many have failed ; and to follow a beaten track, in which so little advance has been made, that ulcers on the legs are not unjustly considered as the opprobrium of surgery.

Ulcers on the legs when regiments are employed on service, are too frequently concealed, and consequently neglected, till they have increased to a considerable size ; and this, in many instances, happens from a desire in the soldier to avoid his duty, or to procure his discharge. In this way, too many men have been finally lost to the army. Whenever this kind of imposition succeeds, it is productive of much greater mischief than the loss of the individual to the service, by in-

ducing other men, when dissatisfied, to make similar attempts, which otherwise would not have been suggested to their minds. It is therefore adviseable, whenever there is the smallest suspicion that any men have hurt their legs from such motives, to keep them in the regiment, even when rendered unfit for duty.

If the idea that this disease is incurable, prevails in a regiment, the soldiers will be very ready to take advantage of such an opinion ; and the surgeon who admits of it, will not be induced to give cases of this kind the degree of attention which is necessary to perform a cure, or to detect those men who are artfully counteracting his endeavours.

As the difficulty in effecting a cure, applies only to those ulcers which have increased to a considerable size, or have been long in a bad state ; there should be a regulation in all regiments, that the smallest ulcers on the legs are to be immediately reported to the surgeon ; the non-commissioned officers of every

company should be required to enforce this regulation ; and all men so reported, should remain under the direction of the surgeon till perfectly recovered.

A regulation of this kind would be the means of saving many good men to the service, and preventing many others from leaving it ; as ulcers on the legs, in their early stages, admit of being healed even by surgeons whose attention has not been particularly directed to the subject.

There is in many regiments, an unwillingness in the commanding officers in companies to have their men put into the regimental hospital for slight complaints ; and those men who are not removed from their barracks, are so little under the controul of the surgeon, that he does not feel them intrusted to his charge ; they are, therefore, of course neglected both by themselves and the surgeon. This is perfectly well known to be true ; and in many slight cases of disease may be productive of no material harm ; but since it is

generally allowed, that ulcers on the leg are so little in the power of the surgeon when they arrive at a bad state, the commanding officers of regiments should put it into orders, that every man affected with such a complaint, is to be placed under the sole management of the surgeon; that the evil may be encountered in time, and the patients have a chance of being recovered.

Men who have been cured, and return to their duty, should be made to wear a bandage and compress for some time, as a support to the newly formed parts, and a defence against accidental violence. A piece of thin tea lead may be used with advantage for this purpose.

If ulcers on the leg, when neglected, are found in the country, to spread and become a very serious disease, it happens in a still greater degree in the West Indies, where the slightest previous hurt upon the leg, or a small ulcer, will, from the effects of fatigue in that climate, in a very short time, become

an ulcer of the worst description, and render the patient entirely unfit for service. Too much attention, therefore, cannot be paid to the conduct of the soldier in hot countries, to prevent ulcers ; and when they occur, to put the men as soon as possible under the direction of the surgeon.

At St. Lucia, during the American war, I had several conversations upon this subject with Dr. Young, physician to the army ; who had been formerly a regimental surgeon, and had served in the Windward Islands in the year 1765, and the three following years. In that period he had made some remarks, which led him to conclude, that tall men are less able to bear the climate of the West Indies, and are more liable to ulcers on the legs than others. As his observations are curious, they are laid before the reader.

Dr. Young observed, that in the 32d regiment, there were 145 tall men, and 276 short men. That in the course of four years 22 were discharged from those of the first

description, and only 23 from the second, on account of ulcers on the legs. The ulcers were of such a nature as to be deemed incurable in that climate. Some of the patients were obliged to undergo amputation, to give them a chance for their lives; others had so many of the muscles and tendons injured as to render them, ever after, unfit for service. The principal cause why tall men are more subject to ulcers on the legs than short men, Dr. Young conceived to be the length of the column of blood in their veins; which, by its pressure, renders the legs less able to recover when hurt by any violence. He observed, at the same time, that tall men are less able to support the heat of the climate; and by losing their general health, are rendered more liable to have ulcers on the legs. From these remarks Dr. Young concludes, that many lives might be saved, by omitting to send any grenadier companies to the West Indies.

After having made these observations on the 32d regiment, Dr. Young went upon the expedition against Martinique and the Havan-

na; and was surprised to find that ulcers on the leg, in another regiment, were less frequent, although the mode of life, diet, and all general circumstances were the same, and the fatigue considerably greater. This he was led in some measure to attribute to the circumstance of the men wearing half boots of cloth, which defended the legs from many slight accidents occasioned by marching through uncleared paths, by kicks, or the bites of musquitoes. They also kept the legs dry; and gave a support to the veins, which woollen cloth gaiters, from their elasticity, will do in a greater degree than those made of leather and linen.*

The mode of treating ulcers on the legs in regimental, and other military hospitals, I have had many opportunities of seeing, while employed as an army surgeon; and have made particular inquiries from those who are at

* Dr. Young did not mention whether the grenadiers were more liable to a varicose state of the veins of the legs, but his observations certainly imply that they were.

present surgeons of regiments, and find it to be still the same. They are commonly all treated upon one general plan. If the ulcers are in a foul state, they are poulticed; when they become clean, they are dressed. The same kind of poultice is used to all foul ulcers, and the same kind of dressing is used to all those which put on a more favourable appearance. If a new mode of treatment for ulcers is at any time published by a surgeon whose character is respectable, this is tried. The result, in general, is, that in some cases it is found to answer; in many others it fails; and, upon the whole, usually falls short of the expectations that had been raised. It is therefore very soon thrown aside; and the old plan, though allowed by every surgeon individually to be bad, is resumed.

Such must of course, continue to be the case, while the disease remains uninvestigated; and the different species of ulcers, and their varieties arising from natural peculiarities, are not understood. Since, without such knowledge, all trials of different applications be-

come so many random experiments, which, by their too frequent failure, will discourage the practitioner from prosecuting so fruitless an inquiry. With a view to enlarge our knowledge, and to establish some general principles, that may guide us in the treatment of ulcers on the legs, an attempt is made to arrange them under different heads, and to point out those distinguishing characters of each species, which will make one mode of treatment more likely to produce a cure than others of a different kind ; giving an account of those local applications of which I have had experience, and their particular effects.

By these means it is hoped, in some measure, to clear the way for those who may be led hereafter to take up this subject ; and that an arrangement having once been made, under which the observations and detached facts noticed by individuals may be collected in a small compass, the treatment of ulcers on the legs may in process of time be very much improved ; and many cases of that kind cured,

which at present are considered as beyond the reach of surgery.

A plan of this kind will be favourably received by the surgeons of the army, who have so many cases of this kind intrusted to their care. It will shew them the extent of the inquiry, and that very little has hitherto been done. It will point out also, how much it is in the power of every individual to add to the stock of our knowledge, and thereby advance his own credit and the public benefit.

CHAPTER I.

ON THE PROPERTIES OF PUS.*

IN considering the properties of Pus, and its effects upon the body, it is not intended to enter minutely into the opinions of either the ancient or modern authors respecting it; or to examine the arguments by which these opinions have been supported; but to endeavour, by experiments and observations, to investigate the different parts of the subject.

It may not, however, be improper to take notice, that the most generally established opinion of the nature of Pus, till within the last thirty years, has been, that it was composed of both solids and fluids; nor is the opinion, even now, entirely exploded. It was called, “true, or laudable Pus;” to distinguish it from a similar discharge,

* The following observations made part of a prize dissertation printed in the year 1788, by order of the *Lyceum Medicum Londinense*:

supposed to be composed wholly of fluids, called Mucus. Yet the distinctions between Pus and Mucus have been very ill defined : there was thought to be a difference, in their appearance to the eye ; but the principal mark of distinction arose from a breach of surface being believed necessary to the formation of Pus, but not of Mucus ; consequently, when there was no breach in the solids, the discharge was considered to be only Mucus.

This notion of Pus must have taken its rise from an idea that the solids of the part were broken down into Pus. The physiologists, who formed this theory, cannot, however, be said to have made their distinctions with great accuracy, since the discharge, in consequence of a blister being applied to the surface of the body, was admitted to be Pus ; although in such cases there is no loss of substance, and therefore the discharge should have been called Mucus.

To ascertain a real difference between the fluid formed where there is a breach in the solids, and that met with where the surface is entire, has been considered an object meriting the attention of some of our most eminent surgeons, although the fluid formed under both these circumstances will be found to be precisely the same. This inquiry must

have arisen from their adhering to the hypothesis which has been mentioned ; and which, not being founded upon the principles of the animal œconomy, can never explain, satisfactorily, any of the operations in the living body.

It will be found upon investigation, that the appearance of a discharge produced from the secreting surface of an internal canal, or excretory duct, when the produce of the suppurative inflammation is exactly similar to a discharge, in consequence of inflammation, in any other part of the body. The only respect in which they differ is, that in the one case there is no breach of surface, and in the other, there most commonly appears to be one. The one is suppuration alone ; the other, suppuration attended by ulceration.

It is intended in the present inquiry ; to collect those properties and circumstances which have been ascertained respecting Pus ; and to endeavour, by investigating others not so well understood, to render the history of it more complete.

Through the whole of these observations, Pus will be considered as a fluid, whose formation depends upon a process in the animal œconomy, analogous to glandular secretions.

It is difficult to give a definition of any thing, the properties of which are not well ascertained ; but as it is necessary to particularize the substance which it is proposed to investigate under the term Pus, it may be defined to be a whitish fluid, made up of globules, and a transparent aqueous liquor. Its production depends upon inflammation having previously taken place in some part of the body, either in the common reticular membrane, upon the internal surface of circumscribed cavities, or the surfaces of internal canals, which form excretory ducts of the body.

Inflammation is necessary for the formation of Pus ; and although a fluid, some-what similar, is produced without any preceding inflammation, such fluid, not having all the properties of true Pus, can be readily distinguished from it.

Pus, whether it is formed in the cellular membrane, upon an investing membrane, or on the internal surface of an excretory duct, has exactly the same appearance, and general properties : no distinctions will therefore be made between Pus produced under this or that peculiar circumstance, believing it, when preceded by the same degree of inflammation in a healthy constitution, and when free from any extraneous substances, to be the same fluid ; but as a difference in Pus may arise from a

variety of causes, it will be proper first to mark these properties which really belong to it in a healthy state of body ; and afterwards mention the variations to which it is liable.

Pus, taken from a healthy ulcer near the source of the circulation, as on the arm or breast, readily separates from the surface of the sore, the granulations underneath being small, pointed, and of a florid red colour, and has the following properties: it is nearly of the consistence of cream ; is of a white colour ; has a mawkish taste ; and when cold, is inodorous ; but when warm, has a peculiar smell. Examined in the microscope, it is found to consist of two parts, of globules, and a transparent colourless fluid ; the globules are, probably, white, at least they appear to have some degree of opacity : its specific gravity is greater than that of water : it does not readily go into putrefaction : exposed to heat, it evaporates to dryness ; but does not coagulate : it does not unite with water in the heat of the atmosphere, but falls to the bottom ; yet, if kept in a considerable degree of heat, rises, and diffuses through the water, and remains mixed with it, even after having been allowed to cool ; the globules being decomposed.

Pus varies in its appearance, according to the different circumstances which affect the ulcer that

forms it, such as the degree of violence of the inflammation ; also its nature, whether healthy or unhealthy ; and these depend upon the state of health and strength of the parts yielding Pus.

These changes arise more from indolence, and irritability, than from any absolute disease : many specific diseases, in healthy constitutions, producing no change in the appearance of the matter from their specific quality. Thus the matter from a gonorrhœa, from the small-pox pustules, the chicken-pock, and from a healthy ulcer, has the same appearance, and seems to be made up of similar parts, consisting of globules floating in a transparent fluid, like common Pus, the specific properties of each of these poisons being super-added to those of Pus. Matter from a cancer may be considered as an exception ; but a cancerous ulcer is never in a healthy state.

In indolent ulcers, whether the indolence arises from the nature of the constitution, weakness of the parts, or the nature of the inflammation, the Pus is made up of globules, and flaky particles floating in a transparent fluid ; and these globules and flakes are in different proportions, according to the degree of indolence : this is particularly observable in scrofulous abscesses, preceded by a small degree of inflammation. That this flaky ap-

pearance is no part of true Pus is well illustrated, by observing, that the proportion it bears to the globules is greatest where there is the least inflammation ; and in those abscesses that sometimes occur, which have not been preceded by any inflammation at all, the contents are wholly made up of a curdly or flaky substance, of different degrees of consistence, which is not considered to be Pus, from its not having the properties stated in the definition of that fluid.

The constitution and part must be in health to form good Pus ; for very slight changes in the general health are capable of producing an alteration in it, and even of preventing its being formed at all, and substituting in its place coagulating lymph. This happens most readily in ulcers on the lower extremities, owing to the distance of the parts from the source of the circulation, rendering them weaker. And it is curious to observe the influence, that distance alone from the heart has upon the appearance of Pus.

A man had a compound fracture of the right leg, and an ulcer on the ankle of the left ; he was in tolerable health, both the ulcers looking well. An attack of fever came on soon after, when the ulcer on the ankle ceased to form good Pus, the matter

not separating readily from its surface, while the compound fracture continued to look very well ; but in twelve hours more, the same change had taken place in the opening of the compound fracture, which was about six inches higher up the leg than the ulcer.

In irritable ulcers, the discharge is often thin, being principally made up of an aqueous fluid possessed of an irritating quality, and containing few globules ; such ulcers are commonly attended with hemorrhage from the smaller vessels, by which means the discharge is very materially altered in its properties, is rendered acrid, and more ready to run into putrefaction than true Pus. We find, however, in many irritable constitutions, the same appearances that were mentioned to take place in the indolent, the coagulating lymph being thrown out, and adhering firmly to the surface of the ulcer ; therefore the appearance of an ulcer alone will not lead us to a correct judgment of its nature, but will only inform us whether it is healthy or unhealthy.

Although these different appearances of Pus have been noticed, from their being so connected with its history as to deserve attention, they are not to be considered as belonging to true Pus ; but as arising

from a defect in the process, whatever it is, by which Pus is formed.

As Pus has been supposed to have a corroding quality, the following experiments were made, to ascertain the truth or fallacy of such an assertion, and it was found to be void of foundation, and to have arisen from an inaccuracy, which prevented observers from seeing the distinctions between Pus in a pure state, and when mixed with other substances.



EXPERIMENT I.

A comparative trial was made upon the Pus contained in an abscess, and on Pus, and animal jelly out of the body. The matter and jelly were in equal quantities, and contained in glass vessels kept nearly in the temperature of the human body. To make the comparative trials as fair as possible, a portion of muscle, weighing exactly one drachm, was immersed in the matter of a compound fracture, in the arm of a living man, and a similar portion into some of the same matter out of the body ; also a third portion into fluid calf's foot jelly, in which

the animal substance was pure, having neither wine nor vegetables mixed with it. These three portions of muscle were taken out once every twenty-four hours, washed in water, weighed, and returned, again. The results were as follows :

In 24 hours—the portion of muscle in the abscess weighed sixty grains, was pulpy and soft, but quite free from putrefaction : that portion immersed in the Pus weighed forty-six grains, was pulpy, soft, and had a slightly putrid smell : the portion in the jelly weighed thirty-eight grains, was smaller, and firmer in its texture.

In 48 hours—the portion of muscle in the abscess weighed thirty-eight grains, and had undergone no change : that in the matter weighed thirty-six grains, was softer, and more putrid : that in the jelly thirty-six grains, and smaller.

In 72 hours—the portion of muscle in the abscess weighed twenty-seven grains, was drier, and firmer : that in the matter eighteen grains, and was rendered fibrous and thready : that in the jelly unaltered.

In 96 hours—the portion of muscle in the abscess weighed twenty-five grains : that in the matter was

dissolved: that in the jelly weighed thirty-six grains.

In 120 hours—the portion of muscle in the abscess weighed twenty-two grains, not at all putrid: that in the jelly thirty-four grains, not at all putrid.

In 144 hours—the portion of muscle in the abscess weighed twenty-two grains, and was free from putrefaction: that in the jelly thirty-four grains.

The next day the jelly had evaporated to dryness, which put an end to the comparative experiment. The portion of muscle in the abscess was kept there a few days longer, without undergoing any change or diminution of weight; and was taken out in consequence of the arm requiring fomentation, which interfered with the experiment.

EXPERIMENT II.

A similar experiment was made upon the matter contained in an abscess recently opened, where the Pus was not pure, but mixed with blood from the

cut edges of the external opening, which had not come to suppuration.

A portion of recent muscle, weighing one drachm, was immersed in the abscess ; and a similar portion in a small vessel of water, of nearly the temperature of the human body.

In 24 hours—the portion of muscle in the abscess weighed twenty-four grains, and was very putrid : that in the water forty grains, rendered smaller, but free from putrefaction.

In 48 hours—the portion of muscle in the abscess was wholly dissolved : that in the water weighed thirty-eight grains.

This circumstance alone of Pus, when in a pure state, not readily taking on the putrefactive fermentation, distinguishes it from those fluids which are not perfect, but a mixture, which Pus must be reckoned, in these instances, where it has extraneous parts mixed with it ; and likewise distinguishes it from the produce of fermentation of animal or vegetable substances, as they run very readily through all the different stages of fermentation, that process being once begun.

The property which characterizes Pus, and distinguishes it from most other substances, is, its being composed of globules. This appears to throw considerable light upon the subject ; since the presence of the globules seems to depend upon the Pus being in a perfect state ; from which we learn the circumstances necessary for the production of good Pus. Mr. Hunter was, I believe, the first who pointed out this property as a distinguishing mark between Pus and animal Mucus.* For the appearance of what is commonly termed Mucus, that is, animal substance dissolved from putrefaction, is flaky, and very different from Pus. It is also by this property distinguished from all the chemical combinations of animal substance that we are acquainted with ; every one of which appears in the microscope to be made up of flakes.

At the same time that this appearance in the microscope distinguishes Pus from other substances, it shows its great affinity to the animal secretions,

* Morgagni quotes Senac as asserting that the globules in the matter of gonorrhœa are much larger than those of common Pus, which are small and unequal. The edition of Senac in which this is mentioned I have not seen, but in the later ones it is omitted, and very properly, as it was evidently erroneous.

although in many circumstances it differs from them.

It differs from the blood in the colour of the globules ; in their not being soluble in water, which those of the blood are ; and from the fluid in which they swim being coagulable by a solution of sal ammoniac, which serum is not.



EXPERIMENT III.

A drop of matter, and a drop of blood, were placed upon a piece of glass, at a small distance from each other, and the glass was fixed under the magnifying lens of a microscope : while in this situation, the point of a toothpick was dipped in a saturated solution of sal ammoniac, and applied to each of them. This was repeated two or three times. The drop of matter, instead of appearing more diluted, became viscid and ropy ; and upon being examined through the magnifying glass, the globules appeared perfectly distinct in the coagulum.

The drop of blood had no appearance of coagulation ; on the contrary, it was more diluted.

This experiment was repeated several times, and the results were always similar.

Pus differs from chyle, in its globules being larger ; not coagulating by exposure to the air, nor by heat, which those of chyle do.

The pancreatic juice contains globules ; but they are much smaller than those of Pus.

Milk is composed of globules, nearly of the same size as those of Pus ; but much more numerous. Milk coagulates by runnet ; which Pus does not ; and contains oil and sugar, which are not to be discovered in Pus.

The cases in which Pus is formed are, properly speaking, all reducible to one, which is, the state of parts consequent to inflammation. For, as far as we yet know, Pus has, in no instance, been met with, unless preceded by inflammation ; and although in some cases a fluid has been formed, independent of preceding inflammation, it differs from Pus in many of its properties, as has been already observed.

In inflammation, the smaller blood-vessels become considerably enlarged ; and, what is curious, this takes place in the greatest degree in the veins ;

the small vessels are not only enlarged, but become more numerous; which does not proceed entirely from the blood being propelled further than usual in the old vessels, but from new ones being formed; and this takes place in a much shorter time than has been commonly imagined. It is highly probable, that these new vessels are so constructed, as to make the blood undergo certain changes, by which the fluid, that afterwards constitutes Pus, is formed.

It has been long ascertained, that new vessels are generated in extravasated coagula of blood, and exudations of coagulating lymph. The following case ascertains the period in which this effect can be produced, to be within twenty-four hours. And we know that Pus commonly requires a much longer time for its formation under the same circumstances, and in similar parts.

I performed the operation for the strangulated hernia, upon a man, in other respects in health, at seven o'clock in the morning. The hernial sac was laid open, and the gut, which proved to be a portion of the ilium, about six inches in length, was attentively examined previous to its being returned into the cavity of the belly: it had the natural polished surface peculiar to an intestine; and although its vessels were turgid with blood, it did not appear

that they were uncommonly numerous. After the operation, the symptoms did not abate so much as might have been expected ; and, during the afternoon, he complained of pain in the lower part of his belly : he had no passage by stool ; and next morning, about seven o'clock, his pulse was scarcely perceptible to the touch ; his skin cold and clammy ; and about twelve at noon he died, having lived twenty-nine hours after the operation.

The body was opened, and the portion of gut which had been strangulated was found considerably inflamed ; the external surface having lost its natural polish, and having several small portions of exuded coagulating lymph adhering to it. The vessels of the gut were minutely injected, the arteries with a red coloured injection, and the veins with a yellow one. Upon examination, afterwards, all these adhering portions of coagulating lymph were found to be injected, having a considerable artery going to each of them, and a returning vein, which was larger than the artery. It is evident, therefore, that the coagulating lymph was laid upon the external surface of the gut after the operation : and we cannot suppose, that any such process as the forming of new vessels could have been going on during the last five hours of his life, when the pulse in the wrist was scarcely to be felt, and the powers

of life were so much weakened in every respect. We must therefore conclude, that the whole operation of throwing out coagulating lymph, and supplying it with blood vessels after it had become solid, was effected in less than twenty-four hours.

This shows, that inflammation forms a vascular surface previous to the formation of Pus. Is it not, therefore, highly probable, that the newly formed parts are so organized as to secrete that fluid.

In considering the time required for the formation of Pus, it is necessary to take notice of the periods which are found, under different circumstances, to intervene between a healthy or natural state of the parts, and the presence of that fluid, after the application of some irritating substance to the skin.

In cases of wounds made into muscular parts, where blood vessels are divided, the first process which takes, is the extravasation of red blood ; the second, is the exudation of coagulating lymph, which afterwards becomes vascular ; and the third, the formation of matter, which last does not, in common, take place in less than two days : the precise time will, however, vary exceedingly, ac-

cording to the nature of the constitution, and the state of the parts at the time.

If an irritating substance is applied to a cuticular surface, upon which it raises a blister, Pus will be formed in about twenty hours, as we find in the following experiment.



EXPERIMENT IV.

A blistering plaster, the size of a half-crown piece, was applied to the pit of the stomach of a healthy young man. In eight hours a blister rose, which was opened, and the contents removed ; they were fluid, transparent, and coagulated by heat ; had no appearance of globules when examined by the microscope ; and in every respect resembled the serum of the blood. The cuticle was not removed ; but allowed to collapse ; and the fluid, which was formed upon the surface of the cutis, was examined from time to time, by a microscope, to detect, as accurately as possible, the changes which took place. The better to do this, as the quantity in the intervals stated below must be exceedingly small, a piece of talc, very thin and transparent, was applied to the whole

surface, and covered with an adhesive plaster ; and the surface of the talc, applied to the skin, was removed and examined by the microscope, applying a fresh piece of talc, after every examination, to prevent any mistake which might have arisen from the surface not being quite clean.

The fluid was examined by the microscope, to ascertain its appearance ; but as the aqueous part in which the globules of Pus swim is found, by experiment, to coagulate, by adding to it a saturated solution of sal ammoniac, which is not the case with the serum of the blood, nor the transparent part of milk, this was considered as a property peculiar to Pus ; and, consequently, that it would be a very good test by which to ascertain the presence of true Pus.

In 8 hours—from the time the blister was applied, the fluid discharged was perfectly transparent, and did not coagulate with the solution of sal ammoniac.

In 9 hours—the discharge was less transparent ; but free from the appearance of globules

In 10 hours—the discharge contained globules, which were very small, and few in number.

In 11 hours—the globules were numerous ; but still the fluid did not coagulate with the solution of sal ammoniac.

In 12 hours—the appearance much the same as before.

In 14 hours—the globules a little larger ; and the fluid appeared to be thickened by a solution of sal ammoniac.

In 16 hours—the globules seemed to form themselves into masses ; but were transparent.

In 20 hours—the globules were double the size of those first observed at ten hours, and gave the appearance of true Pus in a diluted state ; the fluid was coagulated by a solution of sal ammoniac ; the globules, at the same time, remaining perfectly distinct ; so that this may be considered as true Pus.

In 22 hours—no change appeared to have taken place.

In 32 hours—the fluid was considerably thicker in consistence, the number of globules being very much increased : but in no other respect, that could

be observed, did it differ from that formed twenty hours after the application of the blister.

As the results of microscopical experiments have been found exceedingly fallacious, a prejudice has very naturally arisen against all experiments of this kind upon the secretions of the human body, from a supposition that they are not to be depended upon. But it is right that we should discriminate, and not condemn the use of the microscope altogether, because, from ignorance of its principles, it has been misapplied; since these very deceptions have been the means of our acquiring a more accurate knowledge of the use and application of that instrument.

The errors in the use of the microscope have arisen from increasing the magnifying powers of the glasses too much, and not taking in all the circumstances relating to the refraction of the rays of light; making no allowance for the aberration. An attention to the aberration alone will explain the different appearances under which the red globules of the blood have been represented. Some have found them perfect spheres; which will always be the case when the glasses are perfectly adjusted, and the object placed at the true focal distance. Others have found them annular, from the object being at the focal distance of the rays transmitted near the cir-

cumference of the magnifying glass, which are refracted in a greater degree, and consequently shorter than the central rays. Others again have viewed them as flattened bodies of a circular figure, bright in the centre, and becoming darker towards the edges; which appearance arises from the object being at the focal distance of the central rays of the magnifying glass, which will be less refracted than those near the circumference. Although such are the errors which arise when microscopical researches are pushed beyond certain bounds; yet that the red part of the blood is made up of globules is a discovery, for which we are indebted to the microscope; and which seems to be as well ascertained as any discovery in anatomy or physiology. The appearances of Pus which have been mentioned are equally distinct, when examined on the field of a microscope, as the globules of the blood; they are visible with a small degree of magnifying power; and are the same to the eyes of different persons.

The time required to form Pus, on a secreting surface, appears, from the following experiments, to be five hours.

EXPERIMENT V.

A common bougie, four inches long, was introduced into the urethra of a healthy young man. The surface of the bougie was not oiled, which made the irritation more violent, and prevented there being any ambiguity in the appearance of the fluid collected upon it.

In $\frac{1}{2}$ an hour—the bougie was withdrawn, and the fluid on its surface, examined by the microscope, was found to contain globules that were very small, and few in number, resembling those found under the cuticle in the blister at ten hours. The bougie was again introduced.

In 1 hour—the fluid had the same appearance.

In 1 hour and $\frac{1}{2}$ —the globules larger and more numerous.

In 3 hours—the globules more numerous.

In 4 hours—the globules larger; but the fluid did not coagulate with the solution of sal ammoniac.

In 5 hours—the globules large and numerous : the fluid coagulated with the solution of sal ammoniac. This was therefore considered as true Pus.

To prosecute this inquiry still further, an attempt was made to ascertain the changes this fluid undergoes from the time of its leaving the extremities of the vessels which form it, till it becomes that thick fluid we find upon suppurating surfaces, called Pus.

The experiments were made upon a healthy granulating ulcer, on the upper surface of the prepuce of a healthy young man, about two inches square, forming good Pus.



EXPERIMENT VI.

The surface of the ulcer was exposed; wiped dry, and a piece of talc applied upon one part of it, leaving the rest exposed. The surface of the talc was almost immediately covered with a thin fluid. This, in about three minutes was removed and examined by the microscope : it appeared to be transparent; and although examined for some time, did

not change in any respect from the appearance it at first exhibited.

This experiment proves, that the fluid, formed during exposure, is not Pus at the time of its formation.



EXPERIMENT VII.

The ulcer was wiped, and four very small pieces of talc applied upon different parts of it; immediately afterwards the whole was covered with a plaster of common cerate, spread upon lint, to prevent the evaporation of the fluid.

In 5 minutes—one of the pieces of talc was removed, and the fluid on its surface examined; which appeared like a thin transparent jelly, divided into masses; but in which no globules could be distinguished.

In 10 minutes—another piece was examined, and the appearance was like the former, but, at the bottom, a number of small globules could be readily discerned.

In 15 minutes—a third piece was examined, and the whole mass appeared to be made up of small globules ; but these were almost transparent, and seemed to become more distinct and opaque while looking at them.

In 20 minutes—the fourth piece was examined, and the globules were found more numerous and opaque, like those of common Pus.

From this experiment we find that Pus, at its formation, does not contain globules ; but is a transparent fluid, of a consistence, in some sort, resembling jelly, and that the globules are formed while it lies upon the surface ; requiring, in some instances, fifteen minutes for that purpose.

To see how far the formation of the globules depended upon the fluid remaining in contact with the granulations, the following comparative experiment was made.



EXPERIMENT VIII.

The ulcer being exposed and wiped dry, two pieces of talc were applied, to different parts of its

surface, and the whole covered as in Experiment VII. In five minutes, one piece was removed, and the transparent fluid, mentioned above was met with ; but no globules. The surface of the talc, on which the fluid lay was then covered with another piece of talc, to prevent the fluid coming in contact with the granulations, and it was applied again to the ulcer. In twenty-five minutes more, it was examined by the microscope ; as also the fluid upon the other piece of talc, which had remained thirty minutes, and, in both of them, the globules were distinct and very numerous ; but most so upon the portion of talc in contact with the ulcer.

This proves that, after the fluid is once separated from the vessels, the formation of globules is a change taking place within itself, independent of the granulations which secrete it.

EXPERIMENT IX.

A piece of talc was applied as before, and the whole ulcer covered for two minutes ; the piece of talc was then removed and examined by the microscope : at first, no globules appeared. The examination was continued five minutes ; in which time

the globules became exceedingly distinct to my own eye, and to the eye of another person well versed in microscopical experiments.

This experiment was repeated several times ; but the quantity of fluid was in general so small, that it evaporated to dryness before the change into globules took place.

From this last experiment, it is not only evident that the formation of globules in matter is a change that takes place in the fluid after it is secreted ; but it further proves, that the globules are formed in a much shorter time when the fluid is exposed, than when kept from the air. And, we are led, from the whole of these experiments, to conclude that the time required for the formation of Pus, in the state we commonly find it upon a healthy ulcer, varies according to circumstances, and is from five minutes to twenty.

CHAPTER II.

GENERAL OBSERVATIONS ON ULCERS ON THE LEGS.

THE treatment of ulcers on the legs is by no means confined to the practice of military hospitals; the disease is too frequently met with in all large cities, and wherever a number of labouring men are employed. But in no situation is their treatment, as a general practice, an object of so much importance as in the army; where the disease not only brings distress upon the individuals, but deprives the public service of a greater number of men than the country, in time of war, is able to afford.

The frequency of this disease, with which all our public hospitals are crowded, gives the surgeons belonging to these institutions ample opportunities of seeing such ulcers in all their different states; of considering their nature, of comparing the effects of different modes of treatment, and of ascertaining, by experimental inquiry, what are the speediest as well as the best means of effecting a cure.

To this inquiry I was led at a very early period, both by the precept and example of the late Mr. Hunter, whose active mind was always aiming at the improvement of his profession ; and the public situations in which I have been placed during the last twenty-two years, both abroad and at home, have afforded me opportunities of making a great variety of observations.

Ulcers on the legs have naturally attracted the attention of surgeons in all ages, and many very valuable works have been written on the treatment of them. On a careful examination of these productions, it will be found that this branch of surgery has been progressively improving, along with anatomy, and the knowledge of the animal œconomy ; and we must consider that it is, as well as them, still capable of further improvement. These ulcers are to be regarded as a distinct consideration from those which occur in the other parts of the body ; since they vary among themselves in a much greater degree. This may be considered as arising from the following causes.

The legs, by their situation, are more remote from the source of the circulation than the other parts of the body, and are therefore less perfectly supplied with pure blood. In many, and those the

most usual positions of these limbs, the blood, in its return to the heart, is obliged to ascend against its own gravity, which retards its progress; and thus the smaller vessels are kept in a state of too great distension and resistance from the pressure of this column of blood.

From these circumstances it must appear, that the legs even in health are weaker in their vital powers than the rest of the body; and when, from previous accident or disease, new parts are to be formed, the actions in the smaller arteries, by which this should be effected, are impeded by the languid state of the circulation in the veins of the limb, whenever the body is put into an erect posture. If, on the other hand, to obviate this disadvantage, the body be kept for any length of time in a recumbent position, this is found so injurious to the general health, as in that way to interfere with the production of healthy granulations.

This deficiency of vital powers in the legs, when compared with the rest of the body, occasions them to be more readily affected by every thing that weakens or disturbs the constitution; and when in a diseased state, the symptoms will of course be influenced by the natural or acquired peculiari-

ties, as well as by the actual state of the constitution, with respect to strength or weakness.

As no two constitutions are exactly similar, so it happens, that an ulcer on the leg has not in any two persons exactly the same character; for whatever general resemblance one may have to another, there will be found also some peculiarities by which they may be distinguished. It is therefore not sufficient for the cure of such ulcers, that the surgeon should be acquainted with the general treatment; a knowledge of these distinguishing peculiarities, and their probable causes, is also necessary to enable him to treat with success the cases of those individuals who may be entrusted to his care.

As it is the influence, which the state of the general system has upon ulcers on the legs, that gives to them a variety of dispositions, it does not unfrequently happen that such ulcers on the same person shall at different times, from the changes which have taken place in the constitution, require very different modes of treatment.

From these observations it must appear obvious, that there is no probability that any one medicine can ever be discovered, which, whether internally

administered, or locally applied, shall have powers adapted to the cure of all ulcers on the legs; and it would appear, the idea that such a medicine may exist, has retarded very considerably, the advancement of our knowledge in the treatment of ulcers, by inducing surgeons to make use of the same applications to ulcers very different in their kinds.

As no general medicine therefore can be applicable to all ulcers, our study should be to ascertain the real powers of those medicines we already possess, and to discriminate the different kinds of ulcers to which they are respectively adapted.

While the doctrine of the humours was in general repute, internal medicines were supposed to be capable of removing almost every disease, and, among the rest, ulcers on the legs; but practice did not confirm this theory; and external applications were of necessity employed, before the cure could in many cases be effected.

When, from the advancement of our knowledge of the animal œconomy, it was ascertained that every part of the body has actions going on within itself for its own increase, for repairing the waste

naturally taking place, and restoring parts that have been destroyed ; and that these actions in the different parts can be influenced by stimuli, locally applied, both more immediately and more efficaciously than through the medium of the constitution, local applications to ulcers were naturally preferred to internal medicine ; and experience has sanctioned this preference.

The number of external applications recommended for the cure of ulcers on the legs, is very great ; many of these have, by their effects, established a reputation beyond all dispute, and are in very general use. Others are of a more doubtful character, their healing powers resting upon hypothetical reasoning, derived from their effects upon dead animal matter, as being dryers, and by that means, causing parts to skin over ; effects which do take place under their use, but do so equally soon under the use of other medicines, which are known to have no such properties.

It has been a question, whether all ulcers on the legs ought to be healed, even when we have the power of doing it. If this question is examined only so far as respects the origin of the ulcer, it is very readily answered ; for if the ulcer is a breach in the solids in consequence of an accident, there can

be no doubt that the breach should be repaired, and the parts reinstated as soon as possible ; and if the ulcer arises from disease, there can be as little doubt that the disease should be cured. But this question has been considered in another point of view ; it has been supposed that an ulcer once formed, has a power of drawing off, from the general system, impurities which do not find a ready passage by the natural outlets of the body ; and therefore, although the body went on very well before such an ulcer was formed, when once this new channel is opened, and the impurities of the blood have taken that course, if it be suddenly stopped, they may not readily go off with the natural excretions ; and by being confined, may do a great deal of harm.

This theory is very plausible, and while the doctrine of the humours was generally believed, must have been unanswerable. But if the production of Pus be an action of the parts surrounding the ulcer for their own recovery ; if it be independent of the general system, otherwise than as it occasions a greater supply of blood than usual, to be sent to that part, then this theory must fall to the ground.

From these observations it appears, that the different kinds of ulcers on the legs, may be safely healed, there being no chance of any thing being

thrown back, upon the general system, or retained there, in consequence of their cure.

There are circumstances, however, in which it would be improper to heal an ulcer on the leg ; but these are totally independent of the theory I have endeavoured to refute.

If a patient of a gouty habit has an ulcer on the leg, which is evidently affected by the gout, having regular attacks of pain returning at stated periods, and those attacks similar to what the same person had experienced from gout in other parts ; under such circumstances, any attempt to heal the ulcer is improper ; for if it should be attended with success, the gout may fall upon some more important part.

There are many constitutional irritations, equally unintelligible with the gout, which occasionally fall upon the weakest or most irritable parts of the body. If it is found that an ulcer upon the leg breaks out whenever the constitution is disturbed, and if, when that happens, no other part is affected, it would be imprudent to heal that ulcer. Many people are affected in the spring by head-aches, ulcers on the throat, pains in the chest, eruptions on the skin, which ever is the weakest or most irritable part in

the individual who is liable to such attacks ; if any such person should have an ulcer on the leg, and the constitutional affection, whatever it may be, should fall upon the leg, now rendered more susceptible of such attack than any other part of the body, it would be imprudent to interfere, or attempt to heal that ulcer.

That the periodical attacks just stated, with which every one must be perfectly acquainted, are constitutional affections falling upon particular parts, and not really a disease in the parts themselves, will be illustrated by the following instance ; and, were it necessary, a great many others might be given.

A gentleman, who for many years was subject every spring to violent attacks upon his chest, had a disease which took place in the bladder, of a very distressing kind. As soon as that viscus became the weakest and most irritable part of the body, he lost entirely the periodical returns of the complaint in the chest ; they fell upon the bladder ; so that, independent of the constant symptoms peculiar to the complaint, he had regular attacks, at intervals of some months, of the most violent irritation in that viscus.

When any ulcer has existed on the leg for a great many years, it becomes an habitual disease, difficultly removed, and when it has been healed breaks out again ; the parts readily falling back into a state to which they had been long accustomed. There is, however, no reason why the ulcer, under these circumstances, should not be removed, unless the patient be very infirm or old.

At a late period of life it is imprudent to make the smallest change in the œconomy of the body, even in those respects which may appear to its advantage ; for the smallest disturbance sometimes proves fatal.

If, in a weak state of body, a copious evacuation by stool has been immediately followed by death ; if the drawing off the water by the catheter, when it has been too long retained, has had a similar consequence in the course of a few hours ; both of which events I have witnessed ; it shews that the actions of the vital organs cannot go on under such circumstances, if the smallest violence be committed upon any part of the machine, even where it is not attended with any loss to the general system ; for in both the cases which have been mentioned, the contents that were evacuated must have been some

time separated from the system, and deposited in their proper reservoirs.

The removal of any habitual irritation, in such a state of body, may be productive of harm. A person long accustomed to drink a dram in the morning, on leaving it off, has lost his health ; the irritation of an ulcer may have an effect upon the general system, of which it will be dangerous to deprive it. The healing of an ulcer on the leg, as it prevents so much blood from being carried to that part, for the formation of Pus, may, when the machine is falling into decay, increase the quantity carried to the vessels of the brain, and produce apoplexy, by causing some of them to be ruptured.

There is a curious effect of approaching death, which has been sometimes improperly attributed to the treatment of the surgeon. An ulcer of twenty years standing sometimes heals up of itself in the course of a few days, and the patient dies some hours after, or at least in a very short time. This circumstance, of the healing of the ulcer, appears to be an effect of that change which the general system frequently undergoes previous to its dissolution, and corresponds with the sensation of unusual health, often experienced immediately before a severe illness, and also immediately before death.

GENERAL DISTRIBUTION OF ULCERS INTO THEIR SPECIES.

To render the medicines we employ as generally useful as possible, it appears a very desirable object to distinguish the various ulcers on the legs, occurring in practice, into different kinds, as far as we are enabled so to do upon general principles ; and then to state the particular remedies which more properly belong to each of these classes.

If a plan of this kind can be carried into effect, which is the object of the following observations, a surgeon, as soon as the nature of an ulcer shall be ascertained, will very much have circumscribed his subsequent labours ; since he will only have to discover, by trials, which of the medicines found most applicable to that species of ulcer will best agree with the particular case under consideration.

A knowledge of all the medicines fitted for each species of ulcer will also be attended with another advantage ; for it will be found, as will be hereafter more fully explained, that the same application, however it may agree at first, will, if used beyond a certain time, lose its good effects, and therefore

will require to be changed for some other of similar powers.

From all the consideration that I have been able to bestow upon the subject, and my opportunities have been very extensive, I am led to believe, that ulcers on the legs differ from one another according to the following circumstances : local peculiarities, constitutional peculiarities, peculiar dispositions of the parts or of the constitution, and diseased dispositions of the parts or of the constitution. I have therefore divided them into six different species, each of which requires a very distinct and different mode of treatment.

1. Ulcers in parts that have sufficient strength to carry on the actions necessary for their recovery.

2. Ulcers in parts that are too weak for that purpose.

3. Ulcers in parts whose actions are too violent to form healthy granulations, whether this arises from the state of the parts or of the constitution.

4. Ulcers in parts whose actions are too indolent, whether this arises from the state of the parts or of the constitution.

5. Ulcers in parts which have acquired some specific action, either from a diseased state of the parts or of the constitution.

6. Ulcers in parts which are prevented from healing by a varicose state of the superficial veins of the upper part of the limb.

These six species of ulcers are to be considered separately ; and in stating the different applications suited to each species, they will be noticed, where they admit of it, under four different forms ; for the same form of medicine does not always answer in different cases of the same species of ulcer, to which the virtues of that medicine may be generally applicable. In one case, the medicine shall agree best in the state of vapour ; in another, in a fluid state ; in others, in the form of ointment ; and in others again, in the form of powder.

CHAPTER III.

OF ULCERS IN PARTS WHICH HAVE SUFFICIENT STRENGTH TO CARRY ON THE ACTIONS NECESSARY FOR THEIR OWN RECOVERY.

WHEN an accident happens to the leg of a person in perfect health, by which a portion of the skin and muscles is deadened, or only simply divided, if they are not united by the first intention, an ulcer is the consequence. Such an ulcer requires no medicated applications for its cure, the parts having sufficient powers within themselves to restore the lost muscles, cellular membrane, and skin, by the processes of inflammation, suppuration, granulation, and cicatrization; these being the means instituted by nature for the restoration of parts.

In this species of ulcers the matter or pus, which, is formed in the stage of suppuration, is white, thick, readily separates from the surface of the ulcer, and when diluted, and examined in a microscope, is found to be made up of small

globules swimming in a transparent fluid. The granulations are small, florid, and pointed at the top ; as soon as they have risen to the level of the surrounding skin, those next the old skin become smooth, and are covered with a thin, semi-transparent film, which afterwards becomes opaque, and forms cuticle.

All that is required in the treatment of such an ulcer is, to keep the surface clean, and prevent the natural processes from being interrupted in the course of the cure ; this is, in general, best done by the application of dry lint, to absorb and retain the matter, which serves as a soft covering for the granulations, that appears necessary to preserve them in a healthy state, and a pledget of any simple ointment over the whole, to prevent evaporation of the matter, that the dressings may be readily, and, at proper intervals, removed.

This mode of treatment, were it not for the peculiarities of the constitutions of different patients, would apply equally to all ulcers of this species ; but these peculiarities are so various as to require particular consideration.

Although healthy ulcers require no medicated application to be made to them in any case, it is

necessary that the dressing should be of a kind that does not disagree with the granulations, or surrounding skin, since if it does so, in the slightest degree, the progress of the cure will be retarded.

By some patients a roller applied moderately tight, to secure the dressings, will be found so uneasy to the parts, as to make the ulcer lose its healthy appearance, which will be resumed on leaving off the bandage. Several cases of this kind have fallen under my care.

In some instances the application of ointment will disagree even with the neighbouring skin. In others, when superficial, the ulcer will not skin over while the surface is kept moist, and confined from the air ; but if exposed, and allowed to scab, it will heal.

That the modes of treatment which most commonly answer, and consequently ought to be in general use, prove hurtful in particular cases, must be referred to the constitution, which has its influence over every component part of the body. They are entirely unconnected with disease ; for as soon as the offending application is removed, the ulcer continues its progress towards a cure. These peculiarities are deserving of particular notice, since they are

equally liable to occur in the other species of ulcers which we are about to consider, as in these of the healthy kind ; and if not sufficiently attended to, may be mistaken for the effects of diseases, and may lead to very improper modes of treatment.

As in the management of ulcers of this species the great object is a knowledge of the peculiarities of the constitution, if there are any, an inquiry should be instituted into the effects of different applications to the same person upon former occasions ; whether oily or watery substances agreed best with the skin ; whether exposure to the air disposed former ulcers to form scabs, or the reverse ; and if scabs were formed, whether the parts underneath skinned over or not. From such questions a surgeon will in general procure material information, and frequently be led at once to the most judicious mode of practice ; while, on the contrary, a want of attention to these circumstances may be the cause of protracting the cure for a considerable time. The truth of this observation cannot be better illustrated, than by mentioning the following circumstance. A boy at school, by some accident, had several small ulcers on his leg, on which account he was immediately sent home. As he was the son of a nobleman of high rank, every attention was paid to them, all kinds of dressings were tried, but without the desired effect. Under these circumstances, it was proposed (as

there was nothing in the appearance of the ulcers to account for their backwardness in healing) to leave off all dressings, and make him wear a pair of loose trowsers, night and day, to prevent any thing from adhering to their surface : under this mode of treatment they readily healed.

APPLICATIONS CONSIDERED, WITH REFERENCE TO
THIS SPECIES OF ULCER.

1. In the form of vapour.

Nothing should be applied in this form, although it is sometimes done by way of fomentation. The effect, however, is pernicious, since the granulations are thereby rendered looser in their texture, and less disposed to form skin.

2. In a fluid form, or moist state.

Poultices are not less improper than fomentations. Alcohol diluted in different proportions is found, in many instances, to dispose the granulations, when upon a level with the neighbouring skin, to form a scab. When that object is desirable, this method will answer the purpose.

3. In the form of ointment.

Ointments are seldom employed in this species of ulcer with any other view than to prevent evaporation, and are not usually in contact with the granulations ; for this purpose the simplest forms appear to be the best, as that made of equal parts of white wax and olive oil ; the *ceratum epuloticum* is supposed, from the *lapis calaminaris* which it contains, to assist or hasten the formation of new skin. Nothing has occurred within my own experiment, which at all tends to favour this opinion.

The great objection to the common simple ointments—as cerate, and others of that kind, is, that they sometimes disagree with the skin, even when recently made, and in the most perfect state ; but when allowed to become rancid, which they do by being long kept, they too often irritate to a very considerable degree, and aggravate the symptoms they were meant to relieve.

As the army surgeons are supplied with ointments only once a year, or once in two years, and these ointments, from being made in very large quantities, are more liable to suffer in the making, by the heat employed rendering the oil empeurematic ; it would be a much better plan to give an

allowance of white wax and olive oil to each regimental surgeon, who could make them into ointment in small quantities, as he had occasion, so as always to have it in a recent state.

In the West Indies, during the last war, ointments were supplied very liberally by government ; but in that country the heat rendered them so rancid, that they became very stimulating applications, and only adapted to ulcers of an indolent nature.

4. In form of powder, or in a dry state.

If it be thought advisable to form a scab upon the surface of the ulcer, this may be soon effected, by applying a small quantity of any inert substance in form of powder ; but, as dry lint will answer the purpose, I should for many reasons prefer it.

When either of these means are employed, nothing should be allowed to come in contact with the powder or lint applied to the ulcer. This is best prevented by putting a small bolster of linen on each side of the ulcer, and over these a bandage, so that the bandage may form a kind of bridge over it, and be kept at some distance, while it defends the surface from any accidental violence.

Dry lint is the common dressing in use, and, as a general practice, is the best. When the ulcer does not form a sufficient quantity of Pus completely to moisten the lint in twenty-four hours, the dressings should only be changed every other day, as the removal of the lint when it adheres, even slightly, disturbs the formation of new skin, and makes the granulations afterwards less disposed to form it.

A bandage applied tolerably tight, where there is no peculiarity in the constitution to forbid its use, gives a firm support to the muscles and skin, which are frequently loose and flabby from the want of the natural healthy movements of the limb. It is also a defence to the newly formed parts.

CHAPTER IV.

OF ULCERS IN PARTS THAT ARE TOO WEAK TO
CARRY ON THE ACTIONS NECESSARY FOR THEIR
RECOVERY.

ULCERS of this kind differ from those in healthy parts ; the granulations are larger in size, rounded upon their external surface, less compact in their texture, and semi-transparent. When they arrive at the surface of the body, they do not readily form skin, and frequently continue to rise still higher, and then entirely lose the disposition to form new skin. In a still more weakened state of parts, the granulations, after having gone on favourably for several days, shall all at once give way, and be absorbed into the constitution, leaving the ulcer as broad and deep as it was before, the granulations not being strong enough to preserve themselves from decay.

Ulcers may from the beginning exhibit these appearances of want of strength in the newly formed

parts ; or they may at first go on for a few days in every respect like those in healthy parts, but become unable to do so beyond that period, and the granulations then show signs of weakness. For granulations of the most healthy kind, if they are not skinned over in a certain time, appear to lose their original strength, and fall into a weak state.

Ulcers on the legs have been already stated to be influenced, in a very considerable degree, by the natural peculiarities of the constitution ; they are found to be still more so by any thing that affects, in the slightest manner, the patient's general health. The appearance of the granulations undergoes a change, upon the least diminution of constitutional strength ; and if that be restored, the granulations return to their former state ; so that an ulcer of a healthy, kind becomes in general a very accurate index of the strength or weakness of the constitution.

The influence produced upon ulcers by any diminution of the constitutional strength is the greater, the further the seat of the ulcer is removed from the source of the circulation. If a person in a weak state has two ulcers on the same leg, one near the knee, the other near the ankle, as he recovers his strength the two ulcers will assume a more favoura-

ble appearance ; but the effect will not be equal in both ; that nearest the knee will show the first signs of amendment, and will go on healing faster than the other. This may by many be considered as accidental, but the instances of it which occur, appear to be sufficiently numerous to prove that it arises from some general principle.

Whatever disturbs the constitution seems to produce a temporary imperfection in the actions of the animal œconomy ; for while the body is in that state, the progress of healing in an ulcer appears to be at a stand. We see this effect produced occasionally by anxiety of mind. A small ulcer, which the patient is led to suspect may be venereal, will sometimes remain, without making the smallest progress towards a cure, during fourteen days, in consequence of a state of anxiety brought on by this suspicion : but the moment the mind is at ease, the ulcer will begin to heal, and get well in a few days.

These effects upon ulcers, produced by the state of the constitution, are greater in weak and delicate people, than in the strong and robust. They seem to take place in the greatest degree in those constitutions, which, from the effects of particular modes of life, and the influence of different climates, are very susceptible of impressions. The following ob-

servation offers a confirmation of this opinion. In the year 1778, after the naval action between the English and French, the wounded seamen, belonging to admiral Keppel's fleet, were all carried into the Naval Hospital at Plymouth : among them were several hundred patients with ulcers, from accidents on board of ship, and most of them on the legs. Whenever there was any violent and sudden change in the weather, from a dry to a moist state, which is very often the case in October and November, on that part of the coast, it had an immediate effect upon all the ulcers in the hospital ; giving them universally an unhealthy appearance. Instead of Pus, the granulations threw out an exudation of coagulating lymph, which lay upon the surface of the ulcers, looking exactly like melted tallow ; and when the weather changed again, and became dry, they put on a more healthy appearance.

For the cure of this species of ulcer it is necessary to pay attention to the constitution ; such medicines as strengthen are to be employed, as bark, and steel ; and whatever is found to affect the constitution unfavourably is to be avoided as much as possible. By these means the local treatment will be materially assisted. In this languid state it is common to give wine and cordial medicines ; but

the treatment of any set of men should be adapted to their modes of life ; and with soldiers, and indeed the whole class of working people, porter is of much more service than wine ; it does not heat so much, and they in general like it much better. In the present war, the hospitals under Sir John Macnamara Hayes were liberally supplied with porter, and the men recovered their health very fast under its use.

The first object, with respect to the ulcers themselves, is to prevent the granulations from rising higher than the edge of the surrounding skin, since it is a fact well established, that when they are higher than the level, they are not disposed to form skin. This is not sufficiently attended to in common practice ; but another mode is adopted, which is erroneously supposed to produce the same effect. Escharotic medicines are used to eat down the granulations, whenever they are found to be too high, and in this way they are reduced nearly to the proper level. There can be no doubt, that if, by any means, the granulations could be prevented from rising beyond the surface, it would save a great deal of pain to the patient, and be attended with other advantages ; and this may be done, as will be explained, by making use of dressings adapted for that purpose.

It becomes a question, how far escharotics should be employed, even when the granulations, by inattention, have been allowed to become luxuriant ; since the very act of destroying the upper part of the granulations seems to increase the growth of the part that remains, so that the disposition for luxuriance in the new flesh is not corrected, but rather increased, and there is a constant necessity for making use of the same harsh means of keeping them within bounds, till they shall be disposed to form skin ; a process which would have taken place much sooner under another mode of treatment. If, on the other hand, such medicines are used as have a stimulating power, which is proportioned to the strength of the granulations, the superficial luxuriant parts, to which they are immediately applied, will be absorbed, and those underneath will be checked in their growth. Instead, therefore, of touching the surface of such ulcers with the lunar caustic, blue vitriol, red precipitate, or any other of the escharotics in use, the same medicines compounded with other substances, which will diminish their activity, and render them only strong stimulants, may be used with advantage.

To illustrate the difference between the effects of escharotics and of stimulants, in keeping down granulations, I shall mention what happens in the

case of warts ; which are only a luxuriance of growth from the cutis, and, like granulations, and all other newly-formed parts, are weaker in their living principle than original parts.

If warts are touched by escharotics, it is found that their growth is rather increased than stopped by such treatment ; and they cannot be removed by these means, unless the caustic acts beyond the basis of the wart, and destroys a part of the skin underneath. But if a stimulating application, such as the powder of savin mixed with *ærugo æris*, is employed, it excites a degree of action in the wart itself, whose vital powers are weak, and, in consequence of the degree of action thus produced being greater than the parts are able to sustain, the absorbents take them back into the circulation, and the wart is wholly removed ; but if the same application is made to the common skin, it produces no effect at all.

As the great object in the healing of an ulcer is to have the new flesh, by which it is filled up, as strong in its living powers as possible, that it may not afterwards break out again, every thing that can conduce to that end is deserving of attention. It is reasonable to conclude, that in the growth of animal substance, as of vegetables, where there is a

rapid increase, the parts growing are weaker than where it is slow ; and if the granulations, which are already growing beyond their strength, have this rapidity increased by partial removals, they must in reality be rendered weaker than they were before. If this reasoning be just, which there is reason to believe it is (since the observations on which it is founded are taken from practice) the treatment of granulations ought to be regarded in a point of view that has hitherto been little considered. Their growth ought to be kept back in an early stage of their formation, by such resistance as they are just able to overcome ; which will at the same time retard their increase, and allow them to acquire strength by their own actions ; for new-formed parts in a living body are strengthened in proportion to the action they are obliged to exert. This, however, is confined within certain limits, for if the actions are increased beyond the real strength of the parts, the absorbents remove them altogether, and an attempt is made to produce a new growth of granulations, strong enough to support the actions required of them. This they are sometimes unable to accomplish, and the ulcer remains nearly stationary, till the stimulating application is removed.

It is upon this principle that the pressure made by tight bandaging is found so useful in this kind of ul-

cer ; and it is from the same cause that those ulcers, which heal while the patient is walking and using exercise, are less liable to break out again, than those which are healed under the circumstances of rest and perfect quietness.

I have dwelt the longer upon the necessity of attending to the strengthening of granulations, at their first formation, from finding, that after they are once formed they do not appear capable of becoming stronger, in the same degree ; but give way under the slightest increase of motion in the parts, even after they have been allowed what might be considered a sufficient time to acquire strength, and the ulcer itself has been completely healed. We have daily proofs of this weakness of granulations, in all the stages of their growth, in our public hospitals. When a patient is first received with an ulcer in a very disturbed state, from improper treatment, without any distinct appearance of granulations, under the application of a poultice the surface will frequently become clean, and granulations will rise up in every part : these will increase, and appear to be strong and healthy (when superficially examined) while the patient remains in bed ; but as soon as he gets a little better, and walks about, the ulcer spreads ; the motion of the limb being greater than the granulations can support, on which account they

are absorbed, and taken back into the constitution. If the patient be kept in bed, the ulcer will heal, and he may leave the hospital perfectly well ; but as soon as he returns to his usual exercise the granulations, too weak to support themselves, give way, and the ulcer breaks out again, and becomes nearly of the same size as at first.

As this is one of the most common species of ulcer to which soldiers are liable, it is of the utmost importance that military surgeons should be made acquainted with the cause why many of them are so liable to break out again ; that they may avoid this consequence, and by their mode of treatment enable their patients to return to their duty as soon as possible after the ulcer shall be healed.

Ulcers on the leg may be, in the first instance, of the truly healthy kind, but from their size the parts towards the centre may be so long kept from skinning, that the granulations may become weak, and when they have arisen to the surface may remain stationary, without shewing any disposition to form skin. When this is the case they generally, after a day or two, acquire a fresh growth, and become luxuriant.

In the treatment of such ulcers it is therefore

proper to attend to this circumstance, and whenever it is seen that the granulations, though come to the proper height, do not form a thin semi-transparent pellicle upon the surface they are to be considered as weak parts, and treated accordingly. The simplest and best mode, where the constitution has no peculiarity which forbids it, is pressure ; this may be made by a piece of thin lead over the dressings, and will be assisted by a tight bandage on the limb, which by compressing the parts, makes the circulation through the veins less tardy, than when the parts are left to themselves.

APPLICATIONS CONSIDERED WITH REFERENCE TO THIS SPECIES OF ULCER.

It is questionable whether we have any power of strengthening parts by local applications ; but it is equally questionable whether the constitution can really be made stronger by the use of internal medicine ; since absolute strength can only be conveyed to the body by means of nutriment, which is not contained in the substances used in medicine.

It is, however, by no means improper, in the practice of physic, to call those medicines strengtheners which, by their action on the internal membrane of

the stomach, increase the secretion of the gastric juice, so as to convert a greater proportion of the aliment into chyle ; or by their action on the absorbents, stimulate them to take up a greater quantity of the chyle, and convey it into the circulation : or which, by regulating the actions of the different parts of the system, diminish the general expenditure of the nourishment of the body : since all medicines which act in these different ways, do indirectly contribute to render the body stronger than it was before.

The same observations apply, with equal propriety, to the applications made to ulcers in weakened parts. Whatever prevents the granulations from exhausting themselves by luxuriant growth, or stimulates them to draw more abundant supplies from the arteries, does, in effect, render them stronger.

1. In the form of vapour.

The fomentations in common use to many other species of ulcer, are improper in those whose actions are too violent for their powers to sustain, since the application of heat increases the actions of parts, gives them a greater tendency to become luxuriant, and renders them still weaker than they were before. Fomentations sometimes give pain when

applied to parts in a very weak state ; this happens when the action excited by their warmth exceeds what the parts can readily perform ; and whenever this symptom occurs, they should be left off.

Spirits of wine and decoction of poppies, in equal proportions, may be substituted with advantage for the common fomentations, but must not be applied hot. They often soothe the sensations of the parts, and lessen their actions. Where the granulations appear to be disposed to run into mortification, this application is sometimes the means of preventing it.

2. In a watery form or moist state.

Poultices are not adapted to this species of ulcer, for the reasons already stated.

The argentum nitratum in weak solution in water, the strength proportioned to the state of the ulcer, is one of the best applications in a watery form.

3. In the form of powder.

There are several medicines used in the form of powder to this species of ulcer ; of these the most common are bark, and the lapis calaminaris : the

bark is supposed to have a power of strengthening the granulations, and the lapis calaminaris of disposing them to form skin. I have very frequently had recourse to both of them, but cannot, from any experience of my own, speak in their favour ; never having seen the effects that are attributed to them sufficiently obvious to merit the character they have acquired. Powdered chalk and plaster of Paris have been brought into notice, as disposing granulations to form skin ; but such a power appears to be improperly attributed to them.

Powdered carbon has been used with success, but its effects are more conspicuous in ulcers attended with irritability ; than those attended with weakness.

Powdered rhubarb is an application which I have used to different species of ulcers, and ventured some years ago to recommend it to the notice of the public.* It appears more particularly applicable to this species, having a power over the luxuriant growth of granulations, rendering them small and compact, and disposing them to form skin ; but if they have been permitted to rise considerably

* See Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, vol. i.

above the proper level, it is not powerful enough to lower them.

The rhubarb is apt to form a crust upon the edges of the ulcer, which should be occasionally removed, to prevent the matter from being confined under it. This should be done with care, to avoid hurting the new skin which begins from the edges, and to the formation of which this crust seems to be favourable.

If the rhubarb alone is too stimulating, which is sometimes the case, adding one-fourth part of the powder of crude opium, makes it a milder application.

It is to be understood, that when any of the powders above-mentioned are used, a small piece of lint, nearly the size of the ulcer, is to be laid over the powder, and the whole covered by a pledget of simple ointment.

4. In the form of ointment.

Unctuous applications appear to disagree more frequently with ulcers of this kind than any others; and in many instances where they have been long used, the omission of them will be followed, almost

immediately, by a more favourable appearance. This I have seen so often, as to have no doubt of the fact, and even where the powdered lapis calaminaris has been supposed to be beneficial, I have been inclined to suspect that it is in no other way than by defending the surface of the granulations from the ointment, which, before the powder was used, had been more or less in contact with them.

Although ointments are often improper, it cannot be asserted that they are always so, it will therefore be right to try them in those cases where a cure is not obtained by means of the other applications.

The ointment which seems most applicable to cases of this kind, is the unguentum hydrargyri nitrati, mixed with hog's lard, in the proportion of one to five.

Common cerate, with a small proportion of the hydrargyrum nitratum rubrum, is also a useful application. Both these preparations give a check to the luxuriant granulations, and are best adapted for reducing them when they have risen to too great a height.

After having enumerated the various medicines which may be used with success in different cases of this species of ulcer, it may be necessary to mention the order in which they stand in practice ; beginning with those most generally useful.

The rhubarb seems to agree with the greatest number of patients, and is therefore the application to which the first trial should be given. Its effects are not to be decided upon for two or three days, as almost every application appears to be of service for that length of time ; but if the ulcer goes on favourably for a week the medicine is certainly to be continued ; if on the other hand, after the third day the ulcer appears to be stationary, it is then to be left off.

The argentum nitratum dissolved in water, and diluted till the solution, when applied to the tip of the tongue, feels slightly pungent, is to be adopted when the rhubarb does not answer ; and if this also disagrees, or does not produce any amendment in the ulcer, then the unguentum hydrargyri nitrati is to be used ; and if still no progress is made towards a cure, recourse may be had to the ceratum epuloticum, or any other common ointment, with the hydrargyrum nitratum rubrum, in the proportion of half a dram to an ounce.

Which ever of these applications is used the ulcer should only be dressed once in the twenty-four hours, unless the quantity of discharge should prove so great as to require it to be done more frequently.

When the ulcer is on the lower part of the leg, in whatever way it is dressed, care should be taken to support the muscles of the calf of the leg, which in general will be found very flaccid, and when the leg is lifted up from the bed, hanging loose from the tibia. Without such support, the ulcer will frequently resist every means that is used to make it heal. In this state of the limb, the arteries and veins are deprived of their lateral support, so that the circulation through the smaller vessels, is under circumstances unfavourable for the process of forming new flesh.

To illustrate this, it may be proper to state the following case. A gentleman between sixty and seventy years of age, who had lived freely, had an ulcer take place a little above the inner ankle of the right leg; this was at first neglected, as it did not give much pain, but in the course of eight or ten days, it began to spread so rapidly as to give alarm to the patient, and also to the surgeon who attended him; under these circumstances I was called in, the

patient was taking bark and opium internally very freely, and the ulcer was poulticed with bread and milk. From the appearance, I was led to consider this ulcer of the irritable kind, and directed some tincture of opium to be sprinkled on the surface of the poultice, but in two days there was no apparent amendment. I was therefore led to object to the poultice, and thought its weight might occasion the ulcer to spread ; the dressings were lint wetted with a solution of extract of opium in water, covered by an ointment of wax and oil : this in two days had in no respect arrested the progress of the ulcer which was spreading rapidly. Seeing the extremely flaccid state of the muscles, I was led to consider that alone as the cause of the ulcer spreading, and desired the limb to be well supported with a roller as high as the knee, and the same dressing continued. Under this treatment, in two days the ulceration had stopped, the granulations had put on a healthy appearance, and in a week's time, an ulcer three inches broad and five long, was nearly skinned over, and in a few days more was entirely healed.

CHAPTER V.

OF ULCERS IN PARTS WHOSE ACTIONS ARE TOO VIOLENT TO FORM HEALTHY GRANULATIONS; WHETHER THIS ARISES FROM THE STATE OF THE PARTS OR OF THE CONSTITUTION.

WHEN an ulcer takes place on the leg of a person of an healthy constitution, it can only be prevented from healing, under proper treatment, by the weakness of the parts; but when the general system is not perfectly in that state, whether from some natural peculiarity, or some accidental disturbance, this will operate as a cause to prevent such an ulcer from getting well; and to make its apparance vary from that of an healthy ulcer. These changes, when they occur, are generally to be considered as under the influence of the constitution. There are three states of constitution by which the appearance of ulcers is most commonly influenced. The first is a generally disturbed state in which all the actions of the animal œconomy are more rapid than in

health, commonly known by the expression of the body being in an irritable state.

The second is where the actions of the animal œconomy are unusually languid which, to distinguish it from the former, is called an indolent state of the body. The third is where the actions of the animal œconomy are interfered with by some disease affecting the system : when either of these states of the general habit take place, the ulcer acquires a correspondent disposition, and is called, irritable, indolent, or diseased.

It would be natural to suppose these three dispositions so widely different from one another, that an ulcer attended with irritability, one attended with indolence, and one attended by some specific diseased action, must be very readily distinguished by their external appearance. This, however, is by no means true ; for although in strongly marked cases there is no difficulty in judging of the nature of the ulcer from the state of the granulations, this mode of discriminating is not, in the greater number of instances, at all to be relied on.

The disposition of an ulcer, like the disposition of a constitution, is only to be exactly ascertained by determining the actions which arise from the

different impressions made upon it. From a want of attention to this mode of considering the subject, ulcers have been commonly supposed to be of the same kind, where the external appearances were nearly alike; which has retarded the progress of our knowledge on the treatment of ulcers, by preventing a more judicious application of the medicines in use; while, by employing them improperly, their character has been materially injured.

In considering ulcers in parts, whose actions are too violent, attended by irritability, it is proposed not only to treat of those which evidently are so in their appearance; but to include all ulcers, whatever their appearance may be, which locally or constitutionally partake so much of irritability, as to require sedative applications for their cure. This will be found to comprehend a much greater number of ulcers than could at first view be imagined.

There are appearances which at once show the ulcer to be of an irritable kind, and these, when they are present, render all further investigation unnecessary. The following are the principal marks of irritability:

The margin of the surrounding skin being jagged, and terminating in an edge which is sharp and undermined. The bottom of the ulcer made up of concavities, of different sizes. No distinct appearance of granulations, but a whitish spongy substance, covered with a thin, ichorous discharge. Every thing that touches the surface gives pain, and very commonly makes it bleed.

In proportion to the degree of irritability or disturbance, which has been produced in the action of the parts, so is the discharge altered from common pus to a serous fluid, and in some instances it is almost simple water, as in the following case.

A gentleman, 60 years of age, of a very irritable constitution, in March 1798 had a slight kick upon the inner ankle of the right leg, which at the time was not attended to; it did not heal, and on the fourth day from the accident he became generally indisposed, which was considered to arise from the disordered state of his stomach; he fainted away, and upon recovering himself had all the symptoms of a disturbed state of the constitution, in common language called fever: the sore upon the ankle inflamed, was exceedingly painful, the whole leg swelled, and the scarf skin separated from the cutis for an inch all round the ulcer, so that mortification was to

be expected. In this state I saw it on the seventh day, and directed a poultice of bread and water; the serous discharge was very great, the pain in the part severe, and the constitutional indisposition unabated. At the end of five weeks, by the different means used, which were principally the bark, his general health was in some measure restored, but the poultice had brought out pimples on the surrounding skin, and was therefore left off, and a simple white ointment applied; the leg at this time continued swelled, and pitted when pressed.

The ulcer was about half an inch square, and, instead of discharging common pus, it was a limpid water, which in the course of 24 hours completely wetted the compress and bandage; this discharge of water evidently diminished the size of the leg, and in 11 days it was reduced nearly to the natural size; after which the ulcer began to heal, and in a fortnight longer skinned over.

The ulcer, during the whole of this time, was in an uncommonly irritable state, could not bear the slightest pressure, and was attended with a great deal of pain till the last fortnight before it skinned over.

A truly irritable ulcer is perhaps as distressing a complaint as any in surgery, and too often as little within the power of having its symptoms relieved; the pain however, fortunately, in general, gradually abates, being too violent for the parts or constitution long to bear.

When in this state, the pain is not constant, but comes on in fits, usually in the evening or in the night, and at those times is extremely violent, and attended by spasmodic contractions or convulsive motions of the limb, which sometimes extend to different parts of the body.

This symptom arises from the irritation being communicated along the course of the nerves, producing an action in these chords, attended with violent contractions in the muscles which they supply.

To enter more fully into an explanation of this action of the nervous chords at present, would break in too much upon the general view of the different symptoms met with in this species of ulcer now under consideration; it will therefore be reserved for another chapter.

When the marks above mentioned are not present, which very often happens, we are frequently led to a knowledge of the disposition of the ulcer by the previous history of the case, and the effects of different medicines that have been used : but where there is no such history to be obtained, and the appearance leaves us in doubt, it is prudent always at first to take up the treatment under the idea that the ulcer is irritable ; as it is an error, where we are wrong, of the least consequence, and where right, we have a considerable advantage, in not only having gained the whole time of the experiment, but in having saved the patient from a great deal of unnecessary pain.

When an ulcer takes place immediately over the projecting part of the fibula, which forms the outer ankle, it commonly puts on the appearance of an irritable ulcer. This seems to arise from the nature of that part of the limb on which it is situated, independently of any constitutional or local disposition for irritability. It is probable that the periosteum, which at this part lies immediately under the skin, becomes the seat of the ulcer, which renders it very difficult to heal, and gives it this particular appearance. I was led for some years to suspect, that, in all such instances, the bone was injured, from having found that to be the case in several very tedious

ulcers in this part; but have since seen many recover, although very slowly, without the bone being exposed: and therefore conclude, that the difficulty attending the cure, which is almost always found, does not necessarily depend upon the state of the bone.

This opinion is further strengthened by many ulcers situated upon the ligament of the patella, and on the periosteum of the anterior surface of the tibia putting on a similar appearance, and being equally tedious in the cure.

The great object to be kept in view, with regard to the management of ulcers, is that of ascertaining with accuracy their true nature. Too much attention cannot be paid to this investigation. When it is completed, if the ulcer is ascertained to be of the irritable species, little difficulty will remain. All that is wanted will be to find out what particular sedative application may be best suited to the case under our care, and the form in which it can be used to the greatest advantage.

That ulcers are rendered irritable, whenever the actions of the constitution are increased beyond what is necessary for health, cannot be better illustrated, than by stating what has frequently happened on

board the Fleet during the present war. Ulcers have become, in many ships, so general, that it appeared to be an infectious disease spreading by contagion ; the smallest scratch, even the orifice made by a clean lancet in bleeding, degenerating into an irritable ulcer, and spreading to a considerable extent, not running along the skin, nor indeed so readily affecting the skin as the deeper seated parts, the principal mischief being committed upon the cellular membrane, muscles, tendons, and ligaments, the discharge thin and ichorous, no appearance of granulations, and when the tendons were exposed, nervous twitchings taking place in the muscles.

It would seem difficult to account for so very singular a disease pervading a ship's company, at least that the constitutions of the men should be so generally indisposed, that a breach of the integuments immediately degenerated into such an ulcer ; but it appeared to Dr. Baird, the Physician to the Baltic Fleet, that in the ships, on board of which this took place, the men had been taken suddenly from a spare diet to a generous one ; and that the mode of treatment most effectual in his practice was, reducing their general strength by every means, as bleeding, purging, and giving large doses of the citric acid, at the same time giving opium liberally ; but where the strengthening plan was adopted, they not

unfrequently were obliged to have their limbs amputated.

The only rational mode in which this appears to me to admit of explanation is, that the mens' bodies, in a debilitated state, were too suddenly overloaded by supplies of nourishment, which excited great action in the heart and arteries, and hurried on the circulation in these weakened parts, next the extremities ; and when an injury had been committed on them, this violent action in the smaller vessels, instead of restoring what was lost, produced ulceration. This is exactly similar to the effects of warmth to a part which has been frostbitten : in a part so weakened, the action is too great, and mortification ensues, but snow, or very cold water, would have allowed the part to recover. In the one case, the violent action is constitutional, in the other, it is local. It is upon the same principle that a fever, when it attacks a person who has a common healthy ulcer, shall make it worse, but if it is an indolent one, shall effect a cure.

The variety which occurs among constitutions has been already noticed, and we find that its influence produces a similar variety in the dispositions of ulcers. It will therefore be necessary to have a number of different medicines, which

may be used in different forms, and of different degrees of strength, so as to adapt them to the peculiarities of particular cases, even of the same species of ulcer. It is this circumstance which gives the surgeon, who has the most extensive knowledge of the effects of different external applications, a material advantage ; since having greater resources within himself, he will be able to vary his medicines, and will ultimately succeed, where another, whose practice had been limited to a few applications, would have failed of success. The young surgeon should therefore spare no pains in storing his mind with as extensive a stock as possible of this kind of knowledge.

There is a very curious fact respecting the treatment of ulcers, which makes this extensive experience of the medicines which are applicable to them still more necessary : it is, that very few cases will continue to heal, more than for a certain time, under the same treatment ; the effect which any one application produced at first being lost by habit, so that it becomes necessary to change it for some other. This change of treatment, after a certain continuance, is so necessary, that even where the transition is made from a medicine with considerable powers, to one, which, had it been originally applied, would have had little or no effect, will be

productive of an evident advantage. This, however, will be of short continuance ; but if the change is made to a medicine of equal, or nearly equal, powers, the benefit will be more permanent.

This fact corresponds with what is stated to happen in the practice of medicine, in many diseases of the system, both with respect to internal medicines, and external circumstances. A change of air is often found to be necessary, not from a worse to a better, but because the patient has continued too long in the same air, so that it is simply a change that is wanted ; and benefit would be derived from it, even if it were made from a purer air to one of less salubrious qualities.

APPLICATIONS CONSIDERED WITH REFERENCE TO THIS SPECIES OF ULCER.

It will be proper to state the different applications suited to this species of ulcer ; leaving it to the judgment of the practitioner to select such as may be adapted to the peculiarities of the cases which are entrusted to his care.

1. In the form of vapour.

Medicines in this form are more immediately applicable to irritable ulcers, than to any others, since warmth very generally allays irritation, and soothes the sensations of the patient.

The vapour of common water, from its degree of heat, is very soothing to many ulcers in an irritable state ; it is, however, very seldom used by itself, but united with other substances, which either have, or are supposed to have, some sedative quality.

The vapour of spirits mixed with that of water adds to its powers of allaying irritation.

Opium is used with advantage, as a fomentation in different forms : such as the tincture of opium sprinkled on flannels wrung out of hot water ; the extract of opium dissolved in hot water ; or a decoction of poppy-heads, heated, and applied by means of flannels.

Chamomile flowers infused in hot water ; the tops of wormwood boiled so as to form a decoction ; and the fresh or dried leaves of hemlock boiled into strong decoctions ; are also used as fomentations. The extract of hemlock, and extract of opium, dis-

solved in hot water, make a very useful liquor for fomenting, where there is much irritability.

The great disadvantage attending the use of fomentations is, the short time they can be conveniently applied at any one time ; but their beneficial effects in many instances remain for hours after they have been used.

There are cases of irritable ulcers which are rendered more painful by the application of any thing warm. In such ulcers there is generally a discoloration upon the limb, of a mottled, purplish appearance, for some way from the ulcer ; the lower part of the leg is also unusually cold. When that is the case, fomentations ought not to be used. It will often be found, in those instances, that there is a tendency to mortification, the parts being extremely weak, as well as irritable, and scarcely able to support themselves in their present state, so that the action excited by the warmth hurries on the ulceration of the weakest parts, or produces mortification, both of which processes are attended with pain.

2. In a moist state.

The most simple application in this form is the common poultice, which may be made with bread and

water, with a little sweet oil, or hog's lard, or bread and milk. Water is often preferred, as the milk very soon becomes offensive to the smell. There does, however, as far as the evidence of patients can be relied on, appear to be some soothing property in milk, since the parts are easier in many instances under a poultice of that kind, than one made either with water or decoction of poppies. Linseed meal has some advantages over bread in forming a poultice ; it does not require oil, which is found often to disagree with an ulcer, it has a degree of tenacity, and can therefore be kept more immediately on the part, and it is more readily removed. It is also sooner made, all that is necessary being the pouring boiling water on the meal, after which the poultice is immediately fit for application. A mixture of bread and linseed meal in different proportions, makes a very good poultice, and is in many instances preferable to the linseed meal alone.

The extract of lead dissolved in water has been much recommended as an application in form of poultice ; and in many cases it answers very well, but in a great variety of instances it does not agree with the parts ; and when long applied, it has been known to bring on the lead cholic. It should therefore be used with caution. Lead applied to ulcers, in patients whose constitutions are very irritable,

very often disagrees, and not only irritates the surface to which it is applied, but is either absorbed or affects the extremities of the absorbents, so that they inflame, and the glands through which they pass become swelled: of this effect several instances have come under my care, in which, upon leaving off the lead, the symptoms have subsided.

This is the more deserving of attention, as we are in general unwilling to attribute the unfavourable changes any disease takes, to the mode of treatment, which, however, is not unfrequently the case. The following instance is of this kind.

A gentleman about 60 years of age had an accident by which he broke his shin, to the hurt part he applied a solution of Goulard's extract of lead; this was on the 4th of October, 1798. Impatient of confinement, he increased the strength of the solution, but the small slough formed by the accident had not separated on the 8th of November; it was not a quarter of an inch in diameter; the lymphatics of the leg and thigh, had become painful; the leg and foot were cold, and the glands between the thigh and groin had swelled, and threatened suppuration. In this state I saw him, and attributed all these effects to the solution of lead; it was immediately left off, the glands in the groin, and the small ulcer on the

leg, were bathed with equal proportions of decoction of poppies and chamomile flowers : in two days the slough separated, and in four the glands subsided, and the ulcer healed under the use of powdered rhubarb. Spirituous applications had disagreed with his skin upon former occasions, which led him to use the solution of Goulard's extract of lead ; and when much diluted, any hurt to which it had been applied got well, but in this instance, it had been made too strong, and had acted as a violent cause of irritation.

Decoction of poppy-heads makes a very useful liquor for a poultice ; this also disagrees in some instances, but less frequently with irritable ulcers, than the preparations of lead.

Carrots grated, and beaten into a pulp form a substance which in its consistence makes a very good poultice, and, from the properties of the carrot, is well adapted to irritable ulcers ; many of them healing more readily under its use than by any other mode of treatment. It is curious to observe what slight circumstances make a material difference in the effects of a medicine upon an ulcer. In a particular instance of an irritable ulcer, which had been under the care of several different surgeons, and to which a variety of applications had been

made, every thing that was tried disagreed with it, except the carrot poultice ; even this, made in the manner above mentioned, did not give it the least disposition to heal. It was therefore proposed that the carrots should be boiled and beaten into a pulp, before they were applied, the pain was immediately diminished, and the ulcer healed by a continuance of that application.

As the greatest objection to poultices, in most cases of this kind, is their weight, it becomes an object of attention, wherever it can be done, to let the limb rest upon the poultice, and not the poultice upon the limb ; when this cannot be managed, and the weight of its application gives pain and uneasiness, so as more than to counterbalance its beneficial effects, it will be better to change it for some lighter application.

Where poultices agree, it is a matter of some consequence to determine how long their use should be continued. This will depend principally on the appearance of the granulations ; if they are small, and the ulcer is rapidly diminishing in size, no change should be made till the cure is completed ; but if the granulations are become large and looser in texture, it appears proper to leave off the poultice, even where the ulcer is evidently contracting.

It is proper to mention that many irritable ulcers will begin to heal before they put on a healthy appearance; and after they have skinned over to a considerable extent, the remaining ulcer shall still have a foul appearance; while this is the case, the poultice should, I believe, always be continued.

Where poultices cannot be used, in consequence of their weight being more than the parts can bear, one of the following solutions may be applied upon lint: extract of opium dissolved in water, decoction of poppies; tincture of opium; decoction of cicuta; aqua lythargyri acetati composita; solution of argentum nitratum, in a diluted state. The best mode of using these medicines would probably be keeping the parts constantly moist, by renewing the application as often as it became dry; but as this would be attended with a great deal of trouble, it cannot be pursued as a general practice; and a pledget of white ointment over the dressing prevents the lint from drying and sticking to the surface of the ulcer.

3. In a dry form.

For ulcers of this species there are few medicines in form of powder that are sufficiently mild in their properties to admit of being employed.

The carbon has been lately introduced into practice, and by some practitioners highly extolled. From what experience I have had of it, it appears to be an useful medicine, in many cases of irritable ulcers ; having found it to agree where other more common applications have failed. It has this disadvantage, that its colour prevents the surface of the ulcer from being distinctly seen at each dressing ; and any attempt to wipe it clean gives pain, and irritates the granulations.

The extract of opium, in the form of powder, mixed with the carbon, in equal proportions, or with any other powder, as the linseed flour, is an useful application. It is a circumstance deserving of observation, that in some cases the opium is absorbed in sufficient quantity to affect the system, and produce sleepiness. When this happens, it is difficult to determine whether the benefit arises from the immediate action produced on the ulcer, or the effect the opium has upon the system.

Opium, externally applied, sometimes gives pain, and when that happens, it generally aggravates the other symptoms.

The extract of opium in some cases appears to act as a poison, producing the most violent effects of in-

flammation, which terminate in mortification ; these however, are rarely met with ; the possibility of such an effect taking place becomes a strong reason against the application of opium in so concentrated a form, where there is a great degree of irritability in the parts.

The following observations made by Mr. Adair, while surgeon to Chelsea Hospital, on the use of opium to ulcers, has been communicated to me by Dr. Heberden, who found them among his father's papers, to whom they must have been given by Mr. Adair ; they confirm in the strongest manner the above-mentioned circumstances in favour of the local use of that medicine.

“ In Chelsea Hospital there are many old ulcers of the legs, which frequently, in a short space of time, increase in size, and become very painful, and troublesome to manage.

“ In April and May, 1780, several of these ulcers, which had increased in size, and become very painful, were dressed with lint, dipped in a solution of opium in water (in the proportion of an ounce of the extractum thebaciū, to a pint of water) at the same time, some ulcers in the same state, were dressed with a poultice of bread, into which half an ounce of

the above solution was put : in all these cases, immediate ease and sound sleep, were procured ; (although to most of these patients opium had been previously given by the mouth, and had not procured them sleep ;) and they remained drowsy through the day : on continuing these applications a few days, repeating them night and morning, some patients complained of pain in the head, with dimness of sight ; others of sickness, diarrhœa and pain in the bowels ; in all their sleep was disturbed ; and the discharge from all their ulcers was much lessened. Those patients, who were treated with the solution in the poultice, neither felt these complaints so early, nor so violently, as those who were dressed with lint dipped in the solution. In all these patients, on leaving off the use of the solution, their complaints disappeared, and the discharge from their ulcers returned as before.

“ On December 23d, 1780, two patients were affected with the same painful kind of ulcers, and were dressed with lint, dipped in a solution of opium in water, much weaker than the former (a dram of extractum thebaciūm to a point of water.) On the 25th, the first patient was attacked with pain in his bowels, and a slight purging. 26th. His complaints were increased, and he complained also of pain in his head, and giddiness ; the solution was

left off this day, and his complaints went away gradually. The second patient did not make any complaints, before the 26th, when his bowels were uneasy, and he was affected with giddiness, and dimness of sight: the solution was now applied only once a day. 29th. His symptoms having increased, the solution was left off entirely, and his complaints left him: in both these cases ease was procured on the application of the solution, as in the others; in both, the discharge from the ulcers was diminished, and increased again on leaving it off."

4. In an unctuous form.

This form of application is not well adapted to the generality of irritable ulcers, for the following reasons. The oil or lard, which makes a part of the preparation, is generally rendered more or less rancid, as has been already noticed, by the process of forming the ointment, which is commonly by means of heat. It also happens, that the skin of persons whose habits are irritable, and who are therefore most liable to ulcers of an irritable nature, frequently will not bear the application of common ointment. Under such circumstances very few unctuous dressings can be used.

In some cases of irritable ulcers, cream, where it can be procured, is often a very soothing application ; the cases in which it answers best are where the parts cannot bear warmth, the pain being increased by it ; there is a coldness in the cream, which in such instances considerably mitigates the painful sensations.

As a substitute for cream the following ointment is used with advantage : hog's lard purified by frequently washing it in spring water, and then made into an ointment, with a small portion of white wax and rose water.

The unguentum cerussæ acetatæ agrees in some particular cases, but in many others it appears to do harm ; the same caution is therefore necessary here as when the solutions of lead are employed.

These are the only ointments in general use that can be recommended in ulcers which belong to this class.

5. Bandages.

In this species of ulcer benefit will rarely be derived from compression. The surface of the ulcer is, in general, unable to bear any pressure

without being rendered more painful, and whatever gives pain proves in these cases injurious. The bandage employed should only be sufficiently tight to retain the dressings in their place ; nor should it even be more so, upon the other parts of the leg.

It does happen that a tight bandage will bring on spasms which extend all the way up to the body, and when the compression is removed, they go off.

In other cases where there is a less degree of irritability, and that arising from weakness, compression within certain limits may be used with the greatest benefit.

In this species of ulcer it is very difficult to give any particular directions respecting those medicines that are to be tried in preference to others.

Poultices are the safest to begin with, and when it shall be thought right to change the application, the surgeon will have acquired a degree of knowledge of the disposition of the ulcer, and the peculiarities of the constitution, which will guide him in his future choice.

If the degree of irritability be very great, he will adopt those medicines which are the mildest in their nature, softest in their form, and can be used with the least pressure arising from their weight. Among these cream, or the ointment substituted for it, are probably the best applications.

If the irritability is not great, but the parts little disposed to heal, the weak solution of the *argentum nitratum* is one of the best medicines.

CHAPTER VI.

EXPERIMENTS AND OBSERVATIONS ON THE IRRITABILITY OF NERVES, BY WHICH THE SPASMODIC AFFECTIONS ATTENDANT UPON IRRITABLE ULCERS ARE ACCOUNTED FOR.

THE nerves have been hitherto considered as chords that have no powers of contraction within themselves, but only serving as a medium, by means of which the influence of the brain may be communicated to the muscles, and the impressions made upon different parts of the body conveyed to the brain.*

The difficulties which attend every attempt to investigate the real state of the nerves in the living body, and the impossibility of acquiring any infor-

* These observations on the irritability of nerves were laid before the Royal Society in November, 1800, and have a place in the Philosophical Transactions.

mation upon this subject after death, may be urged in excuse for this opinion having been so universally received, since it will be found, from the following experiments and observations, to be void of foundation.

The only means by which any knowledge respecting the irritability of nerves can be procured, must be from the operations in surgery performed upon nerves, either in a healthy state, or under the influence of disease ; or from experiments made upon animal bodies before they are wholly deprived of life, and instituted for that particular purpose.

My attention was directed to this subject by the following case, which explains many circumstances respecting the actions of the nerves when under the influence of disease, and gave rise to the experiments and observations contained in this chapter.

A person thirty-six years of age, naturally eager and anxious in his disposition, whose stomach was peculiarly irritable and irregular in its action, in the winter of the year 1796, while riding in the country, was thrown from his seat by a sudden motion of the horse ; and in endeavouring to save himself, fell with his whole weight upon the end of his thumb, against the pommel of the saddle.

The part swelled, and became very painful. A few days after, he hurt it again, which prevented the swelling from subsiding, and it remained uneasy and enlarged for three or four months. It afterwards got well, but the motions of the thumb were not always under the command of the will ; so that he was sensible, in the years 1797 and 1798, while writing, of finding a difficulty in forming particular letters.

On the evening of the 16th of October, 1799, which was cold and damp, he was travelling in a post-chaise with two other persons, and let down the window, to speak to the driver. A cold wind blew directly into the carriage, and he endeavoured to pull up the window ; but, not seeing the glass rise, he looked down, and his hand, instead of pulling up the window, was lying upon his knee. The thumb was bent in towards the palm of the hand ; a spasm came upon the muscles of the arm, making them bend the elbow ; and immediately he became insensible : in a quarter of an hour he perfectly recovered himself. Some hours after, upon his bending his thumb, to shew what had happened to him in the carriage, there was a return of the same attack, which also rendered him insensible for a few minutes.

From this time, he had no return of these attacks for nine weeks ; at the end of which period, on the 18th of December, 1799, he was waving his hand over his head, with a degree of eagerness, as a sign for some people to make haste and follow him ; this exertion made the thumb contract towards the palm of the hand, and he fell upon the ground in a state of insensibility. This attack went off as the others had done ; he had another in the evening ; and, in the course of the next day, two more, equally violent. As the motion of the thumb was the first symptom in all these attacks, the assistants were led to contrive a glove, the front of which was strong enough to resist the motion of the thumb, and to keep it in its place ; while this was kept on, the attacks were less frequent. A ligature was then applied round the fore-arm ; when the thumb was beginning to be agitated, this was tightened, and the spasms were found to be arrested at the ligature, and of course deprived of their violence.

From this time, a tourniquet was kept constantly upon the fore-arm ; and a person was always in readiness to tighten it, the moment the spasm was expected, which was always preceded by a general feel of uneasiness all over the body ; as soon as the spasm went off, which it did instantaneously, the tourniquet was loosened. The spasms in the

thumb and fore-arm returned frequently, and at irregular intervals, generally every three hours, sometimes oftener, and once did not come on for thirty-six hours.

On the third or fourth day, electricity was tried, with a view to relieve them ; sparks drawn from the thumb, produced tremors in the muscles, which were confined to the thumb. An electric shock through the ball of the thumb, brought on a very severe spasm in the arm ; but neither sparks, nor a shock through the other thumb, produced any sensible effect.

On the 29th of December, I first saw the patient ; and, after watching the symptoms for three days, made the following observations upon the complaint.

That the beginning of the attack was some involuntary motion of the thumb and fore-finger ; and therefore, the disease appeared to be in the branch of the nerve which supplies these two parts, called by Winslow, the median nerve.

That the progress of the spasms was in the direct course of the trunks of the median nerve, up to the head.

That compressing the parts in the course of that nerve, when it was done before the spasms had reached them, always arrested their progress; but, when once the muscles had become convulsed, or agitated, the same compression had no effect in stopping the progress of the spasms.

The mode in which the spasms were propagated along the course of the nerves, was as follows.

Five or six tremors took place in the flexors of the thumb and fore-finger; then similar convulsive motions affected the muscles of the fore-arm; soon after, the muscles of the arm were thrown into the same kind of action; afterwards the pectoral muscle, and scaleni of the neck: the muscles of the lower jaw were probably in the same state, although their action was not within the notice of the by-standers. The head was pulled forcibly to that side, in quick successive motions, and in a second or two, the whole ceased; the parts became tranquil, the insensibility went off, and the patient recovered himself: there was, however, a general feel of langour and distress over the whole body, before the recovery.

From these observations, the disease appeared to be decidedly in the inferior branches of the median nerve; and the irritation was conveyed along its

course, from its terminations in the thumb and fore-finger, to the origin in the brain.

It was proposed to divide the nerve, as it passes from under the annular ligament of the wrist towards the thumb, to cut off the communication between the diseased extremities and the trunk of the nerve, and so put a stop to the progress of the irritation which constituted the disease.

That such an operation might be attended with success, was not only rendered probable from reasoning, but the performing it was fully justified by the success which had been experienced from a similar operation, in some cases of the TIC DOULOUREUX ; a disease, in many respects, of the same nature with the present.

All these circumstances were explained to the patient, who from a desire of obtaining relief, consented to have the nerve divided. This was done on the first of January, 1800, in the following manner : the nerve, as it passes from under the annular ligament, towards the thumb and fore-finger, was laid bare, for above an inch in length : it was then detached from its lateral connections, and, in this exposed state, a probe-pointed bistoury was passed behind it, and the nerve was raised upon the edge

of the instrument, so as to be distinctly seen by the different medical gentlemen present, before it was cut through. As soon as it was divided, the two cut ends retracted from one another, to a considerable distance. This retraction was very unexpected, as the nerve was disengaged from the cellular membrane, and no other part had been divided, whose action could make the portions of the nerve recede.

That nerves, when divided, do retract, is well known in the practice of surgery; but this effect has been usually attributed to the contraction of the neighbouring parts, as the cellular membrane and blood-vessels, with which the nerves are connected. As none of these causes could produce the effect in the present instance, it was natural to suppose, that an independent action existed in the nerve itself, which had been so much increased by the influence of disease, as to become unusually great; and therefore, the retraction was more distinctly seen than in a healthy state of the body.

The moment the nerve was divided, there was a spasm over the whole body, and a momentary insensibility. The blood-vessels divided in the operation were not secured by ligature, but allowed to stop of themselves, to give the wound every chance

of healing by the first intention. The edges of the skin were carefully brought together, and kept in that state by compress and bandage, to promote as much as possible the union.

For eight hours after the operation, the parts were perfectly quiet, and there was no spasm. The wound then began to feel hot, as if a red hot coal had been applied to it. To relieve this sensation, the outer bandage was loosened, and immediately there were twitches in the nerve, which soon went off. The patient felt himself generally unwell, extremely nervous, and irritable,

Ffteen hours after the operation, he had a violent spasm, which went along the arm to the head, but did not affect the brain. In an hour there was a second attack, at which I was present; the pulse was 105 in a minute, the tongue white, a great deal of general irritation, nervous twitches all over the body, but in the greatest degree in the arm and leg of that side. The stiff-fronted glove was now put on, to confine the thumb.

Twenty-four hours, or one day, after the operation, the first dressings were removed: the thumb was much swelled, and no union whatever had taken

place ; the spasms returned every five hours, but were less violent.

The second day, there was no abatement of the symptoms, but the spasms did not affect the brain ; they were not now stopt by the pressure of the tourniquet, as they had been before the operation.

The third day, there were intervals of ten hours between the spasms ; and, in the night, they did not extend beyond the elbow.

The fifth day, suppuration took place in the wound ; the swelling in the hand was much abated ; and the patient was able to dress and shave without spasm, having only twitches in the fingers, and tremors in the fore-arm.

The sixth day, there was a burning pain in the hand, and a numbed heavy feel in the thumb and fore-finger, similar to^r what the patient recollected to have felt four years before, when he hurt his thumb.

The seventh day, the patient awoke with great pain in the hand, succeeded by a violent spasm, which passed up to the head, although the tourni-

quet had been previously tightened : after this, he had no spasm for sixteen hours.

The eighth day, the hand was less swoln and less painful ; and he had only two spasms in twenty-four hours.

The ninth day, the swelling had subsided, and the twitches ceased ; in thirty hours, there was only one slight spasm, which did not go beyond the wrist.

The sixteenth day, the wound was entirely healed ; and, as there had been no return of spasms, the patient was considered as well.

On the twenty-fourth day, which was a fortnight after the spasms had ceased, at nine o'clock in the morning, he was awakened by a violent spasm, which passed directly up to the head, and affected the brain, producing insensibility ; this was the only time the brain had been affected since the operation.

Two days previous to this attack, he had a violent diarrhœa ; and, on the preceding day, had undergone unusual fatigue.

The tourniquet which had been laid aside, was now applied ; and, for the greater security, two were placed on the fore-arm, and one upon the arm itself. At six in the evening, there was another spasm, attended by insensibility, although the tourniquets had been tightened. The hand was found swoln, as well as the wrist, and the cicatrix formed a hard welt, tender to the touch. This hard state of the cicatrix, in which the end of the divided nerve was included, appeared to be a probable cause of the return of the spasmodic attacks.

The twenty-fifth day, the pulse was 100 in a minute ; and, every two hours, there were slight spasms.

The twenty-sixth day, there were eleven spasms at irregular intervals, in twenty-four hours, eight of which, went up as high as the head. As the spasms were not stopped by the tourniquet, as before, it was proposed to make the pressure directly upon the nerve : this was done by placing pieces of cork in the course of the nerve, and confining them there by the band of the tourniquet, so that, when the screw was tightened, the cork was pressed down on the nerve. This pressure gave great pain, and, instead of arresting the progress of the spasms, seem-

ed rather to increase their violence ; it was therefore left off.

The twenty-seventh day, the pulse was only between 80 and 90 in a minute ; there were seven spasms, all of which were arrested by the first or second tourniquet.

The spasms went on with very little variation, till the 39th day at six o'clock in the morning, when he was seized in his sleep with a violent spasm, attended with insensibility, and convulsions over the whole body : these lasted for twenty minutes. After his recovery, the hand was found much swoln, and the welt formed by the cicatrix was painful. In the course of the forenoon he was well enough to bear going out in the carriage ; the fresh air always proving very grateful to him.

From this time, the swelling of the hand and the hardness of the welt diminished ; and the spasms were less violent, and seldomer. On the 45th day, there was only one slight spasm in twenty-six hours. In this state he went into the country ; and, for the first fortnight, the spasms diminished, but afterwards became more violent.

The return of the spasms, after the wound had been healed, made it evident, that the operation of dividing the nerve had not answered the purpose which was expected from it. The failure probably arose from the wound not healing by the first intention : the consequent inflammation rendered the cut end of the nerve uncommonly irritable ; and, in this state, the confinement in the hard thickened cicatrix rendered it liable to be stretched by every motion of the thumb, so as to bring on spasmodic contractions.

From this time, the patient was not under my direction ; but I understood, that he tried the effect of large doses of opium, which did not afford relief. He was then induced to employ electricity, which was also unsuccessful ; and he died in a fit, which at the time was believed to be apoplexy, about five months after the operation had been performed ; but, as the body was not examined, the nature of the fit could not be ascertained.

In this case, some of the branches of the median nerve had acquired, from disease, an unnatural power of contraction, which was made evident by the operation ; and there is every reason to believe, that the spasmodic attacks which took place were in reality convulsive motions in the nerves themselves,

which excited corresponding contractions in those muscles that were under their influence.

This case naturally occupied my mind; and I could not avoid dwelling upon many of the extraordinary symptoms which made a part of it; but nothing so impressed itself upon me, as the retraction that took place in the cut ends of the nerve, at the time of the operation.

The first idea which suggested itself was, to endeavour to ascertain whether this retraction arose from an increase of a natural action in the nerve, or from one newly acquired, produced by disease.

With a view to ascertain this point, different experiments were instituted. The object of these was, to determine whether a similar contraction took place in nerves, when divided in a healthy state of the body; the extent of such contraction, if any occurred; and the circumstances by which it may be influenced.

For the first of these purposes, the following experiments were made.

Exper. 1. The cutaneus internus nerve of the fore-leg of a young rabbit was laid bare, where it

passes down before the biceps flexor cubiti muscle : the nerve was disengaged from its lateral attachments ; and, while the limb was in a moderately extended state, a probe-pointed bistoury was passed behind it, by which means it was divided transversely. The two ends immediately receded from each other : the upper portion appeared to retract more than the other, and the end lay close to the muscle, in a straight line, while the end of the lower portion was a little bent to one side. The space between them, when measured by a pair of compasses, was found to be $\frac{2}{3}$ of an inch.

The branch of the musculo-cutaneous nerve, which lies near to the cutaneous internus, was divided in the same manner ; and the retraction of the cut ends was found to have been to the same extent.

In this experiment the limb was extended, although by no means to its utmost limits ; it therefore became a question, whether the same degree of retraction would take place in the bent state of the limb.

To determine this point, the experiment was repeated, after an interval of four days, upon the other fore-leg of the same rabbit, with the limb in the bent

state : the retraction, however, was found to have been exactly to the extent of $\frac{2}{8}$ of an inch.

From this experiment, made under these different circumstances, a retraction of the cut ends of a divided nerve was ascertained to take place, which led to the further prosecution of the inquiry.

For this purpose, the phrenic nerve in the horse was selected, as being more favourable, in many respects, than most others in the body, both from its superficial situation in the chest, and its great extent without giving off any branches.

In making experiments of this nature, it is an advantage that the animal should be of a large size ; and the mode in which horses are killed in London affords an opportunity of experiments being made on that animal, without giving the operator the painful sensations of having made any addition to its sufferings.

As horses are killed at stated times only, and these occur in a part of the day which is necessarily occupied by my professional engagements, the following experiments were made by Mr. Clift, the Conservator of the Hunterian Museum, whose accuracy may be relied upon, as well as his abilities in conducting them, having been early initiated, and long experienced, in inquiries of this nature.

Exper. 2. Immediately upon a horse having been knocked down, the thorax was laid open, and the phrenic nerve of the right side, passing round the pericardium, was exposed. It was nearly of the size of a crow-quill, and slightly connected with the pericardium. In this state, the point of one blade of a pair of scissars was passed under the nerve; and, by closing them, the nerve was transversely divided, without the smallest disturbance to its lateral connections. The two cut ends immediately retracted from each other, leaving the space of one inch between their extremities.

This experiment was repeated upon a second horse; and the retraction of the cut ends of the nerve was found to be exactly one inch.

It was repeated upon a third horse; and the retraction was found to be nearly two inches. In measuring the space between the two ends of the nerve, the compasses accidentally touched the lower portion, and the diaphragm was immediately thrown into action.

The result of this experiment not only confirmed the former, which had been made upon the rabbit, but it proved, in the most satisfactory manner, that any action the nerves are capable of exciting is

nearly as strong after apparent death has taken place, from a violence committed upon the brain, as while the animal is in perfect health.

Monsieur Portal, in a paper on a new mode of performing the operation of amputation, published in the *Memoires of the Academy of Sciences* for the year 1773, mentions an experiment made on the sciatic nerve of a dog, in proof of nerves not having a power of retraction, at least none deserving of notice.*

This experiment was repeated by Mr. Clift, on the sciatic nerve of a rabbit. Immediately on dividing the nerve, the cut ends receded from one another: but, that the result might be exactly ascertained, the rabbit was killed half an hour after the experiment was made; the parts were carefully dissected, and the space between the two cut ends measured; which was exactly $\frac{6}{10}$ of an inch.

To ascertain whether this retraction was the consequence of a change taking place in the nerve itself, or arose from any other cause, the following experiment was made.*

* *Memoire sur une nouvelle Méthode de pratiquer l'Amputation des Extrémités*, par M. Portal.

Histoire de l'Academie des Sciences, 1773. p. 542.

Exper. 3. As soon as a horse was knocked down, the chest was laid open, and the phrenic nerve of the right side was exposed : twelve inches in length were immediately measured by a pair of compasses ; and the limits of this portion were marked by a small pin, passed transversely through the substance of the nerve. The part included between the two pins was then separated from the rest of the nerve, in the following manner. The person who was to divide the nerve had a pair of scissars in each hand ; and having passed the point of one of the blades under the nerve, above the upper pin, and having done the same with the blade of the other pair of scissars, below the lower pin, the two pair of scissars were shut at the same moment, and the nerve at these two parts cut through.

This portion was again measured, and, instead of being twelve inches, was now only eleven and $\frac{5}{8}$; so that the irritation produced by dividing it had made it contract $\frac{7}{8}$ of an inch.

This experiment was repeated upon several horses ; and in all these repetitions there was a contraction produced : this varied in the different experiments, and in some of them was only $\frac{3}{8}$ ths of an inch. When the nerve was divided very early

after the animal had been knocked down, it was the greatest; and, in proportion to the delay that took place, so was the diminution in the degree of the contraction.

In these experiments, the nerve, as well as the surrounding parts, was disturbed as little as possible, that the results might be the more readily and more accurately ascertained: this, however, makes them liable to an objection, which is, that the contraction might be produced by the cellular membrane surrounding the nerve; an objection which certainly can have little weight in the peculiar situation of the phrenic nerve, as it lies between the pleura and pericardium, where the cellular membrane can have little influence over it, while the pericardium is left entire.

As, however, the opinion of the cellular membrane being the agent, by which the retraction of divided nerves is produced, has been very generally received, it was highly proper to attend to that circumstance, and have the experiment made in such a way as to prevent any other surrounding part from acting upon the nerve; with this view, the following experiment was made.

Exper. 4. The pleura was removed from twelve

inches of the phrenic nerve of a horse ; and afterwards the attachments between the nerve and pericardium were completely divided : under these circumstances, this portion of nerve was separated, as in the last experiment. This portion was again measured, three hours after, in its detached state, and it was found to have lost $\frac{6}{8}$ of an inch in length. The horse was twenty years old, and was killed on account of its age, which rendered it by no means a favourable subject for such an experiment.

With a view to determine whether the power of contraction in a nerve continued for any length of time after apparent death had taken place, and also to ascertain what proportion of elasticity a nerve possesses (for every part of an animal body that is not rigid appears to be endowed with it in a greater or less degree) the following experiment was made.

Exper. 5. Eighteen inches in length of the phrenic nerve were measured, and separated by means of scissars : the contraction produced was only $\frac{3}{8}$ of an inch ; the experiment being made nearly an hour after the horse was knocked down. Upon being stretched with force, it elongated to $18\frac{1}{2}$ inches ; and, on being left to itself, retracted to $17\frac{7}{8}$. It was kept till next day, and again measured, when it was

only $17\frac{5}{8}$: upon being stretched, it was elongated to $18\frac{1}{2}$; but, immediately on being left to itself, it retracted to 18 inches.

This experiment was repeated upon another horse; and the result was similar, both with respect to contraction which took place after the nerve had been removed from the body, and the elongation which depended upon elasticity.

To ascertain if there was any difference in the appearance of a nerve when contracted, from one in a relaxed state, the following comparison was made.

Exper. 6. A portion of the phrenic nerve, about eight inches long, was removed immediately after the horse had been knocked down. This was allowed to contract; and after it had remained quiet for twenty-four hours, its external surface was exposed by dissection, so that the appearance of its fibres could be distinctly seen. A portion of the same length was removed from another horse who died a natural death, and these were compared together.

The difference in the appearance of these two portions was very great: in the contracted nerve,

the fibres were all serpentine ; in the other they were straight.

The serpentine transverse lines described by Monro appear to be an effect of this contraction of the nerve ; as they disappear when the nerve is relaxed or elongated.* These serpentine lines in the phrenic nerve, in a man who died of a locked jaw, when examined twenty-four hours after death, were much more distinct and regular than in the phrenic nerve of a man who died of a mortification of his arm.

These experiments, upon so large an animal as the horse, made by a person well qualified for the purpose, and repeated sufficiently often to preclude any material fallacy, admit of the following conclusions being drawn from them.

* “ When the nerve is fully relaxed, these serpentine transverse lines are best seen ; when the nerve is moderately stretched, they are much less evident ; when the nerve is greatly stretched, beyond what it ever is in a living sound animal, it appears uniform in its colour and consistence. Hence these lines, are in the *first* place, to be considered as folds or joints in the nerve, and may be compared to the lines in the palm of the hand, serving to accommodate the nerve to the different states of flexion and extension.” (In a note) “ By soaking in water, this appearance is lost.”

Monro on the Nervous System, p. 39.

1. That the nerves of an animal in health are capable of retracting themselves when divided; and that this effect is entirely independent of the parts by which they are surrounded.

2. That this contraction takes place in the nervous fibres themselves; and is independent of the brain, from which they originate, and of the muscles and other parts, in which they terminate.

3. That the contracted nerve exhibits to the eye an appearance of contraction in its fibres, not to be seen when it is in a relaxed state.

As the nerves are so readily influenced by electricity, in exciting the muscles to action, it naturally suggested itself, that some further information might be obtained in the present investigation, by means of experiments made upon the nerves by the electric fluid. With this view, the following experiments were instituted; and Mr. Carpue very obligingly assisted Mr. Clift in making them, and carried one of Mr. Cuthbertson's large plate-glass electrical machines to the slaughter-house for that purpose.

Exper. 7. A portion of the phrenic nerve, twelve inches long, was exposed and divided at both ends,

as in the former experiments. When it had contracted to $11\frac{1}{8}$, a strong electric shock was passed along its substance, from one end to the other; but, when measured again, the length was exactly the same. The portion of nerve was then dissected out, and laid upon a piece of glass; in its detached state, it measured $11\frac{5}{8}$. Several strong electric shocks were passed through it, in the direction of its fibres; but they did not produce the smallest effect upon it.

This experiment was repeated upon another horse, and the result was the same.

Exper. 8. Half an hour after a horse had been knocked down, 24 inches in length of the nerve called par vagum were laid bare, and a portion of it detached from its lateral connections, so that a piece of glass, 12 inches long, was admitted under it, without dividing the nerve from the trunk; in this state, electric sparks were drawn from it, and several strong electric shocks passed through it; but there was not the smallest change to be perceived, either in its length or appearance.

From these experiments it appeared, that when the nerve had contracted itself, in consequence of

being divided, no increase of that contraction was produced by the electric fluid.

To ascertain whether electricity was capable of exciting contraction in a nerve that had not been previously irritated, the following experiment was made.

Exper. 9. Twelve inches of the phrenic nerve were measured; and the limits of that portion marked, by pins stuck through the nerve. This portion of nerve, in its relaxed undisturbed state, had electric shocks passed along its substance; but these were found, upon measuring the portion of nerve, to have produced no contraction in its length. When this portion was separated, as in the former experiments, it contracted to $11\frac{3}{8}$ inches, a diminution of $\frac{5}{8}$ of an inch.

The electric fluid, in this last experiment, excited the action of the diaphragm, but produced no evident or permanent contraction of the nerve; and, when the nature of the contraction of a nerve is considered, it is not to be expected that permanent contraction can be ascertained in any other way, than by separating entirely a portion of nerve from the rest of the system. For the action is continued in tremors along the nerve, in quick succession; and, when the muscle has been excited to contract,

the complete action of the nerve is finished, and it immediately relaxes, or returns to that state which admits of a new action.

This appeared to be the case in several experiments made upon the nerves of frogs, and of quadrupeds of a higher order, by two different metals, as described by Galvani. In all of them there was a convulsion of the muscle, and a tremor in the nerve ; but, such was the rapidity of the effect, that it could not be decided that any motion took place in the nerve, except what arose from the agitation produced by the action of the muscle.

The experiments and observations which have been related appear to illustrate an action in the nervous chords, capable of producing the symptoms which occurred in the case related in the former part of this chapter, and also those met with in many other diseases, the symptoms of which have never been satisfactorily explained.

The hypothesis of a nervous fluid, although it may explain every symptom which originates in the brain, and from thence pervades any part of the system, and every symptom which begins in the extreme parts and goes to the brain, does not give a satisfactory solution of those nervous agitations brought upon an extreme part, which only

proceed for some way in the course of a nerve, and are there arrested, without being allowed to proceed to the brain.

The circumstance of nerves having been divided, and their functions being restored twelve or twenty-four months after, when the two cut ends have been united by a new substance, is a strong argument against the circulation of a nervous fluid ; since no such effect takes place in the pervious canals of the body.

In many diseases, there are symptoms so decidedly confined to the course of the nervous chords, that an impartial observer would be unable to account for them in any other way, than by supposing them to arise from some action in the nerves themselves.

This idea must have been strongly impressed upon the mind of Dr. Mead, who, in treating of his third sort of Quincy, says, all the nerves are convulsed, and the patient drops down dead suddenly.*

The Tic douloureux is a remarkable instance of this kind, both in the circumstances under which

* Mead's *Præcepta Medica*. Quarto, p. 434.

the spasmodic tremors are brought on, and the manner in which they are propagated along the nerve.

In one case of this disease, in which the operation of dividing the nerve was performed, with a view to remove the complaint, union by the first intention did not take place ; and, during the time the wound was open, the inflamed state of the cut end of the nerve made the patient liable to several attacks of the disease, similar to those he experienced before the operation ; but there was no recurrence of them after the wound was completely healed.

This is a very important fact ; as it proves that inflammation on the cut end of a nerve, while in an irritable state, is capable of producing exactly the same symptoms as the original disease. This effect of inflammation upon the end of a nerve explains the startings of the limb, which occur too frequently after amputation.

These most commonly are met with when the limb is taken off above the knee, and the nerves and vessels have been previously inflamed higher than the part at which they were divided ; and where the nerve is confined by the thickened state of the surrounding parts.

The same fact also explains the cause of locked jaw, when it is produced by a wound or bruise upon a nerve, in a constitution either rendered irritable by climate, or naturally so ; also, where the nerve itself becomes diseased, in consequence of the accident.

The following case of locked jaw, from an injury to the thumb, bears so great a resemblance to the case related in the beginning of this paper, as to show that the diseases must be nearly allied.

A lady of a very irritable habit was overturned in her carriage, and hurt her thumb, which swelled very much ; and the skin over the metacarpal bone of the fore-finger, about the size of a shilling, sloughed off. No symptoms came on for fourteen days after the accident, when, upon bending her fingers, violent spasms took place in the thumb, which proceeded up to the neck and lower jaw ; these were exceedingly painful, and the jaw was so much shut, as hardly to admit a tea-spoon. In fourteen days more, the jaw began to open ; and, for a month longer, there were only two or three spasms daily in the thumb, attended with pain ; these went up the arm to the jaw. At the end of that period the sore on the back of the hand healed, and she recovered perfectly from the spasmodic affections.

This action of the nerves likewise enables us to understand the spasmodic affections which sometimes occur in the limbs upon which there are irritable ulcers. These spasms arise from the exposed extremities of the nerves being irritated to an unusual degree; and this irritation not being confined to the surface of the ulcer, but communicated along the course of the nerves, excites an action in those chords, as high as the irritation is conveyed; and a consequent contraction in the muscles to which these nerves belong. These spasmodic affections are, therefore, not wholly dependant on the state of the constitution, as has been in general believed, but are decidedly the symptoms of a local complaint, and within the reach of local treatment, both for their palliation and removal.

It is highly probable, that in many cases of ulcer, the extremities of the nerves that are newly formed in the granulations are more under the influence of external impressions than naturally formed parts, and communicate their action to the nervous chords, of which they are a continuation, producing spasmodic affections of different kinds, which would be immediately removed, were those sentient extremities destroyed.

The following case is in favour of such an opinion; the history is drawn up by Mr. Hen-

ning, the surgeon who had the patient under his care.

A gentleman, who is now 50 years old, when at the age of 36, had a paralytic affection of the right leg and arm, and has never acquired more than a very imperfect use of them. Ten years subsequent to this attack, the scratch of a cat, on his outer angle, formed an ulcer, which healed with difficulty. From that time to the present, ulcers have often occurred on his legs, and though they were always sluggish, yet no uncommon effects attended them. Eighteen months ago, the cicatrix of an ulcer, just beneath the outer angle of the right leg, and two others, in nearly the same situation on the left leg, broke out into sores. These ulcers, during six months, gave no particular uneasiness, but, about the end of that time, the usual dressings began to give pain, and this was attended with involuntary motions of the lower limbs. During the following six months every application was used, which suggested itself to the different surgeons who were consulted. The ulcers, however, remained stationary, and the contractions became still more severe. Opium, which at first controuled the spasms, soon lost its influence.

On the 1st of January, 1801, he became Mr. Henning's patient. There was then a manifest

difference of character in the ulcers on the paralytic limb, from those on the other limb. The edges of the skin, which surrounded the former, being thick, prominent, smooth, and rounded ; while those of the others were jagged, and terminating in an edge, sharp, and undermined. In other respects they were alike, having their surfaces covered with flakes of coagulated lymph, which could not be wiped off ; and a discharge of ill-formed pus. Both legs were *ædematous* as high as the calf. The most cautious touch of a probe covered with lint gave exquisite pain, which was instantly followed by quiverings of the skin, in the course of the superficial branch of the peroneal nerve. These were followed by spasms of the muscles, the heels were drawn inwards and backwards, the knees drawn up towards the chin ; sometimes the patient was jerked out of his chair by their sudden violence ; in general, however, these motions, though irresistibly strong, were gradual, and gave him time to counteract them, by changing the position of his body, and grasping the chair with his hands. By firmly pressing on the nerve, Mr. Henning was sometimes able to prevent the spasms, and sometimes to subdue them ; but the pressure that was requisite could not long be endured, so that when spasms occurred, no means were employed to resist them, and they went off gradually.

The ordinary number of his pulse was 78, but when the spasms were severe, it frequently was found to be 110.

It seemed obvious that the spasms had originally been produced by the irritable state of the ulcers, yet the risque of increasing their violence precluded the use of active dressings, at least till it should be ascertained, whether the sensibility of the nerves might not be blunted by sedatives. With this view, an ointment, composed of pitch and sallad oil, was applied to the ulcers, and it afforded a perfect remission of the spasms during three days. Then its power was greatly diminished, and soon after the spasms recurred on the slightest irritation. The balsam of Peru, extolled by Dr. Kirkland in this kind of ulcer, when used, threw the muscles into the most violent contractions, and every sedative that was employed produced the same effect. It was therefore judged expedient to change the plan, but irritating dressings were insufferable.

Dr. Underwood was consulted, who proposed quieting the parts, by sedative applications, but they all failed. Mr. Home was afterwards called in, and recommended a trial of Mr. Baynton's plan of the adhesive plaster ; under this treatment the ulcer on the paralytic leg filled up with healthy

granulations, which at once put an end to the spasms. But the plasters, though applied with the nicest care, could not be borne by the other leg.

Soon after this, a severe erysipelas overspread the whole leg and foot, and two abscesses formed; these broke; and the sores thus produced were healed by stimulating dressings and pressure: no spasms were brought on by the pain of these dressings. It was expected that some improvement would have been derived to the old ulcers from this attack, but they were not in the slightest degree affected by it.

Mr. Henning, after so many fruitless attempts, was led to destroy the irritated surface of the ulcers, by touching them with a strong solution of nitrated silver, and to diminish the pain arising from its action by means of a full dose of opium; the effects of this application proved milder than those of any which had been employed, except the pitch. It was therefore repeated daily; after the second application, a healthy granulated surface took the place of that which has been described, and the discharge was converted into perfect pus. The spasms diminished in frequency and strength, and soon ceased entirely.

On the 25th of June the patient began to feel nervous twitches in his right cheek ; they were brought on by cold, by friction, or even the touch of a finger. This affection is confined to the second branch of the fifth pair of nerves, and is evidently the TIC DOULEUREUX. These appeared to be gradually increasing upon him on the 7th of July, the time this case was drawn up.

A soldier had a superficial ulcer, four inches square, upon the skin of the shoulder, not going deeper than the cutis ; this began to heal very kindly, and in the course of five days so great a part of it had skinned over, that there was only an ulcer of half an inch square, with a tolerably healthy appearance. At this time symptoms of lock-jaw came on, and in three days he died, although there was no other complaint whatever to bring on the lock-jaw than this small ulcer. If, upon the first appearance of the symptoms of lock-jaw, the surface of the ulcer had been destroyed by caustic, it is probable, from the preceding case, that the disease might have been stopped in its course, or entirely removed.

CHAPTER VII.

OF ULCERS IN PARTS WHOSE ACTIONS ARE TOO INDOLENT TO FORM HEALTHY GRANULATIONS, WHETHER THIS INDOLENCE ARISES FROM THE STATE OF THE PARTS, OR OF THE CONSTITUTION.

THE appearance of ulcers attended with indolence, is the very reverse of that which was described in those of the irritable kind. The edges of the surrounding skin are thick, prominent, smooth, and rounded. The granulations are smooth and glossy on the surface. The pus is imperfectly formed, but not thin and watery ; it consists of pus and coagulating lymph mixed. The lymph is made up of flakes, and is with difficulty separated from the surface of the granulations ; so that when the ulcer is wiped clean, the coagulating lymph adheres in several places, giving a white appearance to these parts of the ulcer. The bottom of the ulcer is commonly all of the same level, or nearly so. The general aspect gives the idea of a portion of the skin and parts underneath having been

for some time removed, and the exposed surface not having commenced any new action to fill up the cavity.

These appearances are only met with in the truly indolent ulcers, in which the symptoms are the most strongly marked : in others of this species the appearances very much resemble those that belong to the last mentioned species, when of the milder kind, and are only to be distinguished from them by the circumstance of mild and soothing applications being either of no service, or even aggravating the symptoms, which is frequently the case.

It may on the first view appear strange that the irritable and indolent ulcers, which are so very opposite in their nature, should ever have the slightest resemblance ; but when it is considered that ulcers change their appearances very readily, according to variations in the state of the constitution, or any accidental circumstance which may have affected the parts, it will be readily comprehended. An indolent ulcer, after any violent exertion of the limb, will have more or less of an irritable appearance. If the patient is exposed to cold, and kept without wholesome food, similar changes will be produced. Under any temporary constitutional indisposition

the ulcer will spread, and be for a time in an irritable state.

It is this species of ulcer which deprives the army of the service of so many men, and which has, with too much truth, been considered as the opprobrium of surgery. In the army, when ulcers from common accidents are not attended to, the patients continue to do their duty in the regiment, use violent exercise, and are guilty of every kind of irregularity: under these circumstances, the ulcers soon degenerate into the indolent kind, and when arrived at this state they are considered as incurable.

Many of these ulcers heal in a very short time after the men are discharged, their own desire to get well making them give every assistance to the surgeon's exertions for that purpose, and the patients are afterwards met with in newly raised corps, in which they had re-enlisted. This is a fact within every military man's knowledge, and is a sufficient proof that the ulcers for which soldiers are invalided are by no means all of them incurable; nor are the men rendered unfit to do the duties of soldiers. If some of them are cured after having arrived at the worst state, and after having remained (which they must have done) for some time in that condition, what

might not have been effected, had they been earlier put upon the right mode of treatment ?

To this species also belong the greater number of those ulcers that are received into the London hospitals, more especially in men, many of which are cured there, although they have perhaps continued for several years.

Length of continuance alone appears sufficient to give an indolent disposition to an ulcer. It is therefore immaterial, whether in its origin it was healthy, only attended with weakness, or even irritable ; if not cured within a certain time, it becomes indolent. This is not, however, always true with regard to the irritable kind, many of which remain so, whatever length of time the complaint may have continued.

An indolent ulcer may be imagined, from its name, and the general length of its continuance, to remain nearly stationary, making little or no progress towards a cure ; but this is not the case, so great a degree of indolence being rarely met with. Such an ulcer is generally forming granulations, but they are unable to support themselves beyond a very short period ; it appears, therefore, to proceed towards amendment, although very slowly, so long as the granulations stand their ground ; and then, all at

once, when they are absorbed, the ulcer spreads nearly to its original size, twenty-four hours undoing all that had been formed in so many days, or even weeks. This is a change which takes place so constantly, and under such different circumstances, that it cannot be attributed to any external cause, but must be supposed to arise from the granulations which are formed in that indolent state of parts being unfit to answer the purpose for which they were intended, and therefore giving way. It is, however, brought on and increased by occasional causes ; as changes in the weather, anxiety of mind, or too great fatigue.

It is a curious fact, that there should be the same want of powers in the granulations formed in indolent ulcers, as in those attended with weakness : although the circumstances seem to be so very different : in both, the granulations are unhealthy ; in the one, indeed, they are luxuriant, while in the other they are deficient. Every deviation from the healthy action, whether it be too great action in weakened parts, or too little action in indolent parts, equally renders them incapable of forming granulations, strong enough to support themselves under the necessary actions of the parts to which they belong. Those formed in the indolent ulcer are much weaker in their living powers than the others ; for

they are absorbed without any evident cause, their powers of life being exhausted, and no longer able to support them.

That in the present species of ulcer, this unhealthiness in the granulations is the effect of indolence is rendered highly probable ; since in some instances it exists in a greater degree when the patient is perfectly quiet, and lies in an horizontal position, than when he is more actively employed ; the common motions of the limb rousing up the actions of the parts, and making them approach more nearly to those of health. A bandage moderately tight, as it gives a support to the muscles, and, by compressing the superficial veins, renders the circulation of the blood in them less languid, seems also materially to assist the cure ; it admits of the limb being used, without so readily feeling uneasiness from fatigue.

Many cases have been cured by means of a tight bandage and exercise, after other methods of a milder kind had failed. So successful has this practice been, that we find it recommended in all cases of old ulcers.

This probably carries the system too far ; there is, however, sufficient evidence to prove, that rest

is less necessary in cases of indolent ulcers, than in many others. The good effects of this plan may partly arise from counteracting those of confinement and a sedentary life, which are, to some constitutions, so extremely hurtful, as to prevent an ulcer from healing while the patient continues under these circumstances. This is very often found to be the case in hospitals, particularly with patients who have lived much in the country, and whose employment has been in the fields ; as gardeners, and husbandmen. Soldiers are taken from various modes of life, but many of them must be of this description.

In indolent ulcers it must appear, from what has been said, that there is a backwardness in forming granulations ; and, in those granulations that are formed, a want of sufficient health or strength to form a complete cure. The first of these effects of indolence is the only one which has been generally attended to in practice ; the surgeon being satisfied if he could in any way heal up the ulcer. This is a very imperfect mode, since we find, that when they are healed by only increasing the growth of the granulations, without altering their disposition, the parts will very soon give way again.

The object of our treatment should be, not simply to produce a cure, but to render that cure as permanent as possible. This is only to be done by changing the disposition of the granulations, and rendering them strong enough to stand their ground, after the ulcer is completely filled up. It is in this view the modes of treatment will be considered.

That the granulations which are formed in ulcers of this species differ very much, in respect to their health and strength, according to the applications which are used during their growth, is sufficiently evinced from daily experience. It may, however, be very readily demonstrated by the following easy experiment. Let an ulcer of six months standing, which has acquired an indolent disposition, have a poultice of bread and milk applied to it for a week ; and at the end of that period examine the granulations ; they will commonly have in part filled up the ulcer, but they will also commonly be large, loose, and glossy in their appearance. If the poultice is now left off, and some stimulating medicine, which agrees with the ulcer, is used for another week, the granulations, when again examined, will in general be found to have undergone a considerable change, appearing smaller, more compact, redder, and without gloss. Where this is the case, it is natural to suppose that the ulcer healed under the last men-

tioned application will be less liable to break out than under the former ; the materials by which it is filled up being of a more healthy kind. The truth of this opinion is not confined to reasoning, but is confirmed by experience. My own observations upon this subject may possibly be thought less impartial than those made by any other person ; this leads me to prefer giving the results which a gentleman, who had extensive opportunities of seeing ulcers treated in these different ways, was led to draw from the facts that came within his notice. He stated, at a medium, that the number of ulcers healed under the use of stimulating medicines, which did not break out again in a short time after getting well, compared with similar cases under a milder treatment, were as four to one ; his remarks were communicated to me, some time after they were made, by a gentleman who consulted me as a patient. After having stated these observations made by another surgeon, it is proper to add, that my experience leads to similar conclusions.

Having so decidedly given a preference to the use of stimulating medicines, in those varieties of indolent ulcers which admit of being healed by different modes of treatment, it will be unnecessary to add, that there is a very small proportion of them that come under that description ; the greater num-

ber not being sufficiently within the influence of mild dressings to admit even of a temporary cure.

The medicines which have been found best adapted to promote the cure of indolent ulcers, under the different circumstances in which they occur in practice, will now be enumerated.

OF APPLICATIONS, CONSIDERED WITH REFERENCE
TO THIS SPECIES OF ULCER.

1. In the form of vapour.

Medicines in this form are very commonly employed in cases of indolent ulcers ; but from the observations which have now been made, it must appear that they are not such as can promote the cure with advantage, nor should they ever be applied with that view. Recourse is only to be had to them, when the ulcer, in consequence of some accidental cause, has put on a foul appearance, and may be said to be in a state of temporary irritation. As this is unconnected with the original disposition of the ulcer, and it is more properly during that period an irritable ulcer than an indolent one, it is to be treated as such till the parts return to their indolent state.

It has been found that soldiers who have had ulcers of some standing, that were in an indolent state, could bear the usual daily exercise, while in fixed situations, without being made worse by it ; but if the men at any time had been obliged to march for several days together, or had been employed on any duty of fatigue, the ulcers put on so very irritable an appearance, as to give the idea of being irritable ulcers of the worst kind. It is therefore necessary, in forming an opinion upon such cases, to inquire into the conduct of the men for some days previous to the examination.

The patients who are received into our London hospitals, from having used too much exercise, and from excesses of different kinds, have in general their ulcers in this irritated state, requiring the use of fomentations and poultices for some time, before the treatment necessary for the cure of the ulcer can be adopted.

The fomentations in use are the decoctions of different herbs, which are supposed, from their properties, to cleanse the ulcer, and give it a better appearance ; and it is highly probable that they deserve this character ; but the warmth which is conveyed to the ulcer is, I believe, the most material circumstance in the application. The decoctions of

chamomile, southernwood, wormwood, and of laurel leaves, are considered as best adapted to this state of such ulcers. When the ulcer is spreading, and very painful, decoction of poppies alone, or mixed with equal proportion of proof spirit, is often of service. The fomentations are commonly applied by means of flannels, for about ten minutes or a quarter of an hour each time the poultice is changed, which is generally twice in the twenty-four hours.

2. In a watery form, or in a moist state.

Poultices are used with the same view as the fomentations, and they may be considered as different parts of the same mode of treatment. The fomentations are the occasional, the poultice the continued, application. Poultices for this purpose are made of the same liquors as are used for fomentations ; but, for the substance of the poultice, bread, oatmeal, or linseed meal, may be used.

As both the fomentations and poultices are only intended to bring the ulcer into a proper state to admit of being cured, they are rather preparatory steps than any part of the regular treatment of such ulcers. In their common state there is no occasion to have recourse to these applications.

In the treatment of indolent ulcers it is very natural to suppose that all medicines, whether stimulating or otherwise, will have a material advantage when used in a watery form, since they will mix with the matter, be more intimately applied to the surface of the ulcer, and remain in contact with it for a longer time ; this is, however, only true with respect to the milder applications ; for to those that are very stimulating, no such continuance of contact is necessary, and were it accomplished, would probably prove hurtful, since the stimulating effects might exceed what the parts can bear.

As ulcers of this species require stimulating medicines, there is therefore no reason for preferring watery to unctuous applications, further than as they may happen to agree better with particular cases.

When stimulating applications are used to indolent ulcers, it is always to be understood that the medicine is only intended to stimulate the parts to action ; but the actions are to be performed by the parts themselves, which, when once stimulated, will proceed to act in consequence of that stimulus, for a considerable time after the immediate effect of the local application has ceased. The stimulating medicine is therefore only to be repeated as

often as is found necessary, to prevent the parts from falling back into their indolent state.

It is in this way only that the effects of stimulating medicines can be explained ; such as a single drop of tincture of opium dropped, once in twenty-four hours, upon the cornea and tunica conjunctiva of the eye, removing an inflammation of the eye, although the tincture is scarcely allowed to remain more than a second of time in contact with the parts ; as the tears immediately wash it off.

The application of sea water to a swelled hand for ten minutes, once in twenty-four hours, will frequently excite the actions of the absorbents, which will then probably continue to act, so that the swelling in a few days will be completely removed.

In these instances the exact time the medicine is applied can be determined with precision, and is very short ; and were it longer, it would, by being too violent, do harm. In other instances stimulating medicines act upon the same principle, and are in general not much longer in immediate contact with the surface of the ulcer.

There are indolent ulcers which occur in patients of debilitated constitutions, that put on a sphacelated appearance, (even after they have made some progress towards a cure) without any apparent cause, and in this way spread to a very large size. This unpleasant change must be the consequence of weakness in the newly formed parts, and some indisposition of the general system. The varieties of this kind that will be necessarily met with in different patients must be very great ; and among them there will be some, which, were they classed according to their appearances, would be generally allowed to belong to the species of irritable ulcers : but as they do not recover under soothing applications, they cannot, according to the principles that have been laid down, be separated from the species of indolent ulcers, of which they appear to be an uncommon variety. They occur in seamen, and land troops which have been long at sea, and when met with in that class of men have been called scorbutic ulcers. They are not, however, in any way, necessarily connected with the sea scurvy, being but too frequently met with on shore, in patients who have never been affected by that disease.

They are frequently met with in the West Indies, in soldiers who had lost their health from the effects of climate ; they are not uncommonly met

with in the London hospitals, in men whose general health has been impaired by the free use of spirituous liquors : and therefore ought to be considered as not belonging to any specific disease, but as common to men whose constitutions are greatly debilitated, whether by salt provisions, the effect of warm climates, or the use of ardent spirits.

In such ulcers a new mode of treatment has been very strongly recommended by Dr. Harness, Physician to the Navy, and one of the Commissioners of sick and hurt seamen, who found that the gastric juice of ruminating animals, used as an external application, made the ulcer, when in a sphacelated state, throw off the sloughs, and put on a milder appearance ; and by a continuance of the same medicine the cure was completed. This he afterwards tried in many instances, and was in general successful.

I was naturally led, from so favourable an account, to make use of the gastric juice in ulcers of this description. It gave a good deal of pain on each application, which lasted for nearly half an hour ; but the ulcer in two days put on a better appearance, and all the sloughs were thrown off. From the pain it occasioned, it must be considered as a stimulating application.

In one case of a patient in St. George's hospital, the gastric juice brought an ulcer of this kind into a favourable state, after which it appeared to be stationary ; but whenever the gastric juice was changed for any other dressing, the ulcer spread ; and when it was again used resumed its favourable appearance : this happened three different times ; the gastric juice must therefore, in this particular instance, appear to have been the only dressing that agreed with it.

The gastric juice, as procured from bullocks or sheep, must certainly be in a very diluted state ; as the liquor found in the true or last stomach, which is the only one that contains it, is in the quantity of two or three pints in the ox, and two or three ounces in the sheep. This practice appears particularly adapted to these ulcers when they occur in seamen ; and Dr. Harness considers it as equally successful in the truly scorbutic ulcer. Of this, however, in London there is no opportunity of making trials. If this be really the case, it is fortunate that seamen are usually placed for cure in situations where the gastric juice can be very easily procured ; as the animals killed for victualling the navy, in the vicinity of the naval hospitals, afford an ample supply for daily use.

In the West Indies, where too many cases occur among the soldiers, bearing a resemblance to those relieved by the application of the gastric juice, the fresh root of the cassada grated into a pulp is employed with evident advantage.* This juice is a poison, taken into the stomach, it must therefore be considered as a stimulating application. In this state of ulcer, lime juice has also been used with great advantage. Solutions of vitriol and alum have been recommended; but I cannot speak, from my own experience, at all in their favour.

When an indolent ulcer has none of the peculiarities which have been mentioned, the stimulating applications in a watery form, that appear the best adapted for promoting a cure, are the following.

The solution of *argentum nitratum*, or lunar caustic, is a very useful medicine as a local application, and one of the best in general use. It stimulates the granulations, and makes them put on a more healthy appearance. It agrees with indolent ulcers in a greater number of patients than many other medicines. It has a material advantage, in being capable of having its strength increased to any degree that can be required, so as always to adapt

* The cassada is the *Satropa Manihot* of Linnæus.

it to the actual state of the ulcer. This is the more necessary, since indolent ulcers, when they have been accustomed to any application, which they are, in general, very soon, they no longer receive much benefit from its use.

It is a curious circumstance, that an ulcer which at first is unable to bear this solution of more than a certain strength, without pain, and without the granulations themselves being absorbed, will usually, from the continuance of the same application for ten days or a fortnight only, be able to bear it of a double strength, without either of these effects being produced ; and that this increased strength will now be necessary to give the same degree of stimulus, which had before been produced by the weaker solution. This may be considered as a proof that the granulations are become much stronger than they were before.

Tincture of myrrh, either pure or diluted, whichever is found best adapted to the state of the ulcer, is, in many instances a good application ; it rouses up the actions of the parts, and gives the granulations a better appearance. But where the ulcer is very indolent, it soon loses its effects, as has been already mentioned to be the case with many other medicines.

The good effects of the tincture of myrrh have been sufficiently established, by general practice, to give it a place among the medicines in use for indolent ulcers on the legs ; but as the opinions of practitioners may differ respecting the extent of its powers, it is right to mention the following proof, taken from a wound of a different kind, as it appears to be a strong evidence in its favour.

A gentleman was cut for the stone, and the wound, some time after the operation, became sloughy ; it was so indolent as not to throw off the sloughs, and from the urine passing over it, the edge of the divided skin was covered with a crust of calculous matter, so that there was not the smallest disposition to heal. Several medicines were externally applied, to alter the state of the wound, without effect ; but tincture of myrrh not only answered that purpose, but under its use the parts were entirely healed.

The tincture of myrrh having considerable powers as an external application, led to the idea of giving it, in a variety of instances, internally, at the same time that it was externally applied, with a view to ascertain its local effects through the medium of the constitution ; but no evident benefit was produced by using it in this way.

Decoction of the walnut-tree leaves, and of the soft covering of the walnut, have been strongly recommended by a surgeon of eminence in Vienna, who states, that its powers in disposing foul ulcers to heal are beyond those of many other medicines.* I have used it in a number of cases of indolent ulcers, and can, from experience, give evidence in its favour.

The diluted vitriolic acid has been employed in particular cases, and has been recommended as a medicine proper for such ulcers; it has not, however, been sufficiently successful to bring it into general use. From my own knowledge I am unable to speak of it, never having seen it used, but have lately heard it well spoken of by an army surgeon, for whose opinion I have a high respect.

The expressed juice of the pod of different species of pepper, in a recent state, has been used as an ingredient in the applications to ulcers of an indolent kind, both in the East and West Indies. What the real powers of the peppers are, when externally ap-

* *Dissertatio de utilitate decocti corticum nucum juglandium siccatorum in tractandis ulceribus*, Authore D. Joanni Hunezowsky. *Acta Academ. Medic. Chirurg. Vindoboniensis*. Tom. prim. 1788.

plied in this way, I have had no opportunities of ascertaining, nor can it be procured in this country for trials to be made with it.

The peppers, given internally, have a power of disposing indolent ulcers to heal, by exciting a degree of action in the parts beyond what is natural to them. It is in this way that Ward's paste disposes slight cases of fistulæ in ano to heal; and makes the wound, after the operation for a fistula, put on a more healthy appearance. The peppers have been known to make a fistula in perinæo close up. This practice may very reasonably be extended to indolent ulcers on the legs; but I have not yet had any experience of its internal use in such cases, and therefore mention it only as deserving of trial.

After having mentioned the medicines in common use to indolent ulcers, it is proposed to add one which has not been before laid before the public.

The nitrous acid, diluted to such a degree as will fit it for an external application, is found, by experience, to be a very useful medicine. The proportions must be varied according to circumstances; but a scruple to eight ounces of water will in general answer. The best mode of ascertain-

ing the proper degree of strength for this solution is by applying it to the tongue, and when it stimulates without being acrid, it is of a proper strength to begin with.

In bringing forward any new medicine, it is not sufficient to mention its effects ; it is also proper to state the reasons that led to its adoption, so that the grounds upon which it was taken up may be fairly understood.

In considering the different applications to indolent ulcers which are in common use, I was led to remark that three of them, on which experience had led me to place the greatest dependance, had the nitrous acid as one of their component parts ; the other part being either mercury or silver. This is the case with the unguentum hydrargyri nitrati, the argentum nitratum, and the hydrargyrum nitratum rubrum. This circumstance appeared deserving of attention, and induced me to believe, that as these three chemical preparations are applied in a very diluted form, they must be in part decomposed ; and in the argentum nitratum some of the metal is separated in form of a powder, before the application is actually made to the ulcer. If this is the case, the detached acid will mix with the

water, so that the efficient part of this medicine, locally employed, must be the nitrous acid.

Upon these grounds the effects of that acid were tried on ulcers of different kinds. With those that were irritable it evidently disagreed. In those that were attended with weakness, in some instances, and in a very diluted state, it produced an amendment ; in others, it retarded their progress ; but in many of the indolent ulcers it promoted, in a very uncommon manner, the progress of the cure.

The apparent effect of the nitrous acid as an external application, is different from that of most other medicines of a stimulating nature : it diminishes the quantity of matter or pus, and instead of giving a healthy, florid appearance to the surface of the ulcer, there is a soft ash-coloured coagulum, which partially covers the granulations : near the circumference this is more compact and harder ; it there forms a complete crust, and firmly adheres to the surface. If the bottom of the ulcer is nearly on the same plane, the greater part of it has this coagulum spread over it, with small interstices, through which the granulations are seen. If the ulcer is hollow in the middle, and gradually rises at the edges, the crust is met with on the circumference or outer edges, while the softer coagulum

is seen within these edges, and in the centre is common pus, till it has attained the level of the other parts. There is a succession of these crusts formed upon the margin of the ulcer, one under the other : these crusts bear a greater resemblance to laminae of common cuticle than any thing else, and the parts underneath evidently rise higher and higher, till they come nearly to the level of the common skin. When that is the case, the crusts are longer in separating by four or five days, and on their removal a very perfect cuticle appears underneath ; much more so than is usually met with in an ulcer cicatrized by means of other dressings

The diluted nitrous acid gives a good deal of pain on its first application, this lasts for about half an hour, and then goes off ; the pain is afterwards less severe.

In one case of a very indolent ulcer the nitrous acid was applied, in the proportion of two drams to ten ounces of water ; it gave little pain, and the parts began to put on a more healthy appearance ; but after having done so, their sensibility was so much increased, that a solution one third of the former strength gave pain, and was rather stronger than the parts could now bear.

The progress in the healing of an ulcer to which the diluted nitrous acid is applied, differs so much from what we commonly meet with, the process of skinning is so much more rapid, and the new skin so much more completely formed, that it was natural to suppose that the medicine produces some very considerable change in the granulations, by which these effects are brought about. What this change is, has not been ascertained; the only visible effect is the coagulation of the pus as it is secreted, which coagulum forms an external application to the granulations, and puts them in circumstances which appear more favourable for filling up parts, and forming new skin. This coagulated matter is thrown off by the pus next secreted, which is also coagulated in the same way, forming another lamina immediately in contact with the granulations. The manner in which the granulations increase, is hidden by this covering, but from their rising higher and higher, it is evident that the parts are very active in forming them.

Pus coagulated by the diluted nitrous acid forms a nidus for the granulations, which appears from the instances in which it has been tried, a better application to them than the pus itself, or many other medicines of a different kind. In a few weeks an ulcer of many years standing has skinned over, to

the extent of several square inches ; and the new skin, a few days after being formed, has very nearly resembled that of the surrounding parts. The skin, in various instances, has formed before the ulcer had been filled up completely, so that the margin of the new skin was a good deal lower than the surrounding old skin ; but some weeks after being skinned over, this difference of level gradually disappeared.

If the solution is too strong, it forms a hard crust over the whole surface of the ulcer, giving it the appearance of being covered by a piece of dry parchment. This should be avoided, as the dried crust remains for several days, after which it is separated, and the progress of the cure is impeded while that process is taking place ; so that by such treatment an ulcer might be kept nearly stationary for months. If this medicine is injudiciously applied, it will be found to produce that effect.

A certain degree of indolence in the ulcer seems necessary, to admit this process to go on ; for in some cases the nitrous acid irritates, and makes the ulcer spread : and even in ulcers with which it agrees, and which heal very fast under its use, if a state of irritation is brought on, it becomes neces-

sary to leave it off, as the ulcer will then spread by a continuance of the application.

In stating that the only visible effect of the nitrous acid is that of coagulating the pus, it is by no means intended to infer that no other effect is actually produced. On the contrary, there is reason to believe that it acts upon the granulations as a stimulating medicine, too violent for several species of ulcers, but adapted peculiarly to such as are indolent; and that the coagulation of the pus is a chemical effect, which answers a secondary but a very salutary purpose.

Several patients with ulcers, which had the nitrous acid applied to them, have been allowed to walk about and use exercise while under that treatment, and have not found the progress of the cure retarded, although no bandage that could in any way support the limb, was applied to it. This, which there is reason to believe will be found to be generally true, is a circumstance very strongly in favour of this application.

In cases of ulcers on the leg, in which there is a portion of bone exposed, which is neither acted upon by the absorbents, nor deprived of life so as to form an exfoliation, the ulcer is prevented from

healing, under these circumstances, applying the solution of nitrous acid to the bone, removes the earthy part ; and excites the absorbents to act upon the animal portion which remains.

By this treatment many ulcers have healed much sooner than they would otherwise have done.

The effect of nitrous vapour, in destroying the offensive smell generated in confined apartments, containing a number of sick people, and its power of preventing contagion from spreading, are very valuable discoveries, made by my friend Dr. Carmichael Smyth ; and there is a satisfaction in being thus able to state, that in a fluid form also, the nitrous acid is a medicine, which is applicable to many cases of surgery, in which it has not hitherto been usually employed.

3. In form of powder.

The only medicine which seems to be adapted to this species of ulcer, in form of powder, is the hydrargyrum nitratum rubrum, all the others being either too mild, or more conveniently used in an unctuous form. From the violence of its action, it is fitted for ulcers of the most indolent kind ; but even to them, it should only be occasionally applied, unless

it is rendered less active, by being intimately mixed in different proportions with some inert powder.

4. In an unctuous form.

Unctuous applications appear to be better adapted to this species of ulcer, than to any other, and they have some advantages over medicines in different forms, since the necessary action is no sooner produced, and the pus, in consequence of it, secreted, than the stimulating application itself is removed by the pus from the surface of the ulcer ; and it afterwards serves as an external covering, by which the pus is confined in immediate contact with the granulations, till the next dressing. The oil becoming rancid, which is so material an objection to this form of medicine in other species of ulcer, is of less consequence in this ; as the medicines combined with it are always more stimulating in their nature than the oil, even in its rancid state.

In the treatment of ulcers, a great stress has been laid upon the bad effects of exposing the surface to the external air, as if atmospherical air contained something that irritated and excited inflammation. In the investigation of this opinion, sufficient proofs have been established, that air has no such property ; since when the abdomen of an animal is filled with it,

no inflammation takes place. If the cellular membrane of the body is loaded with it, these parts do not afterwards inflame. Nor do ulcers in the throat, that must be constantly exposed to the air, heal less kindly than those in other parts of a similar structure.

It does not appear that the exposure to air is in itself peculiarly hurtful ; but, from every observation I have been able to make, an ulcer does not heal so kindly if the parts are disturbed during that process, which they must be when much exposed. The natural easy state, is that of the granulations being covered by their own matter ; which is only to be removed occasionally, that means may be used to stimulate the granulations, to secrete a more perfect pus, or such as is best fitted to cover the granulations during their increase.

According to this statement, frequent dressings, to indolent ulcers, are not only unnecessary, but, when the medicines are stimulating, will do harm. To apply a dressing once in twenty-four hours is commonly sufficient ; nor should it be done more frequently, except when the quantity of pus is too great, which, in this species of ulcer, seldom happens.

The unguentum hydrargyri nitrati mixed with the adeps suilla, in different proportions, according to the state of the ulcer, is one of the best applications to this species of ulcer, in an unctuous form, in general use. The most common proportion is one part of the ointment to three of the lard. It is, however, almost always necessary, after using it for some time to the same ulcer, to increase its strength.

There is, very commonly, to indolent ulcers, a thickened edge, like a welt, all round ; and the skin, to some distance from this edge, is of a darkish-red colour, arising from an imperfect or languid inflammation, extending along the skin of the neighbouring parts. Such appearances are very readily removed by the unguentum hydrargyri nitrati, and the surface of the ulcer, which too often has an ill formed pus, mixed with blood and coagulating lymph laid over it, under this treatment will form healthy granulations.

Upon comparing the effects of this medicine, with those of many others that are used in the form of ointment, it appears to have more influence over granulations, in making them become small and healthy, than any of the rest ; and, what may be considered as a natural consequence of such a property, the ulcer healed by it is less liable to break out

again. It has a material advantage also, in admitting of being made gradually stronger, so that the same degree of stimulating effect can be kept up by increasing its strength, as the ulcer from habit becomes less affected by it.

These are its beneficial effects where it agrees ; but there are ulcers of the same kind in particular patients, in which it does not answer at all, and must therefore be discontinued as soon as that can be ascertained.

The unguentum resinæ flavæ, and the unguentum elemi, are in very general use for ulcers of this species ; they have sometimes the balsam of turpentine, or the balsam copaibæ added to them, and they are frequently applied hot, to increase their stimulating effects, and adapt them to particular cases. These are the most common applications and their effects are too well known to require much being said respecting them in this place.

It may be necessary to observe, that in general the resins and turpentine do not seem to have equal powers with the acids and metallic salts, in giving to the granulations a healthy appearance ; nor do they appear to give them the same disposition to stand their ground when formed.

This observation may not have been made by other surgeons, in the same way that it is now stated, but the effect must have been noticed by those who have published in favour of the hydrargyrum nitratum rubrum, mixed with such ointments, as a means of rendering the cure more permanent. When these ointments are used, the same addition of the hydrargyrum nitratum rubrum becomes necessary, in the proportion of a dram to an ounce; but to be made a little stronger or weaker, according to circumstances.

Camphor mixed with the unguentum album, or any other ointment, may be applied in some varieties of this species of ulcer, but not so generally as the other medicines that have been mentioned; those cases where there is a degree of indolent thickening are most likely to be benefitted by it.

After having enumerated the different medicines which may be used with advantage in indolent ulcers, it seems necessary to state again expressly that these medicines, in many cases, very soon lose their effect; and that in such instances the great art consists in changing the application as soon as this circumstance is discovered. In regulating such changes two things are always to be kept in view; the one, what had been the original state of the ulcer; the

other, what its present appearance ; by which attention it will often be found that one ulcer, in the progress of the cure, may require to be treated in several different ways before it can be made to heal. This is so material a circumstance in ulcers of several years standing, that it cannot be too particularly noticed. There is another thing to be adverted to, that although the ulcer may be in its nature indolent, it is liable to temporary changes whenever the constitution is occasionally affected, and while under that influence is to be treated accordingly. If a patient who has an indolent ulcer, which is going on very well under any stimulating medicine, is attacked by indisposition, the ulcer will no longer bear the former treatment, but requires a milder application ; and this milder remedy must be continued till the general system shall have recovered itself, and then the ulcer will again bear more active medicines.

5. Of bandages.

The great advantages derived in this species of ulcer from an uniform steady compression of the limb, is now universally acknowledged, and some mode or other of producing this effect is, adopted by almost every practitioner. Many surgeons consider a tight bandage as the only thing necessary, and adduce a number of instances in favour of this opinion ; from

such partial evidence, however, we are not justified in drawing conclusions upon a subject so extensive, particularly as the individual cases vary more, according to the constitutional peculiarities, than any thing immediately connected with the ulcer.

Where tight bandaging is employed at the same time that other means are made use of, the beneficial effects which take place cannot be exclusively attributed to either mode of treatment ; it is therefore proper to remark, that in all the cases brought forward as evidence in favour of the different applications that have been here considered, no species of bandaging was used, but what was necessary to keep the dressings applied to the ulcer.

The most effectual mode of compressing the limb, and giving the parts an uniform and steady support, is by means of the laced stocking : this has been long in general use ; it was strongly recommended by Wiseman more than a century ago ; and we must attribute to his recommendation the adoption of it in this country, as a common application.

A roller of calico or flannel applied to the whole leg, from the toes upwards, is a very good substi-

tute for the laced stocking, and answers very well, when neatly applied. Linen does not make so good a bandage for this purpose, as it does not yield to the motions of the limb, and is with difficulty retained upon it, being apt to slip down, from the smoothness of its surface.

6. Of adhesive plaister.

In the former edition of this work, a mode of using the adhesive plaister as a dressing to ulcers, on the legs was taken notice of.*

This mode of treatment was first practised by Mr. Baynton, surgeon, of Bristol, and the cases published of its success were so very satisfactory, as to induce me to adopt it, and give it an impartial trial.

Since that time, experience has enabled me to give ample testimony in its favour, and induces me to consider it as one of the greatest and most useful improvements in modern surgery.

This mode of treatment is therefore now considered under a separate head. It is particularly applicable to indolent ulcers.

* See Descriptive Account of a new method of treating old Ulcers of the Legs, by Thomas Baynton, surgeon, at Bristol.

The strips of adhesive plaister, spread upon linen, are to be about an inch in breadth, or a little broader, and long enough to go completely round the limb, and afterwards return upon themselves for about three inches, so as to keep their hold, and become so many firm annular ligaments ; they are to be so applied, that their edges overlap, leaving no space between them, and the surface of the limb, thus covered, is to extend several inches both above and below the ulcer. The effect of this practice upon old ulcers with thickened edges, where the limb is much swoln, almost exceed credibility. In a very few days the size of the limb, as well as of the ulcer, is greatly reduced, the unhealthy appearance of the granulations wholly removed, and the matter reduced in quantity, and rendered of a better consistence.

As the plaister is directly applied to the surface of the ulcer, at the same time that an uniform and steady support is given to the limb, it is not easy to ascertain, whether the beneficial effects arise wholly from the well regulated pressure or not ; but, as in practice, the cure appears to be retarded by having lint or any other dressing under the plaister, there are grounds for believing the composition of the plaister itself is an useful application to such ulcers.

Since this mode of treatment has been published, cases of ulcers have got well under my care by its use, which were certainly not to be healed by any other mode, that had been tried.

The following very remarkable instance of this kind will support the opinion just stated.

A gentleman, aged 64, of a full habit of body, rather a free liver, with a naturally strong constitution, six feet in height, while in Gibraltar, in the year 1769, had a small ulcer, from the bite of a musquito, on the inside of the left leg above the ankle; this was several weeks before it could be healed, and in the following winter broke out again, and was a still longer time of being healed. He went to India, where he remained ten years, and in that period it broke out five different times, but was never so bad as to confine him. Upon his return to England it was in the state of a small ulcer, and the whole leg larger and harder than the other. It was healed by means of tight bandages, and continued well for five years.

At this time, which was in 1785, a sore broke out on the opposite side of the same leg, which never healed, continuing sometimes better, at others worse, but did not confine him from busi-

ness till the year 1796, when the pain became violent, upon hanging it down, and at all times the ulcer was troublesome, often depriving him of rest at night ; since that time the ulcer remained nearly of the same size, the leg gradually increasing in size and hardness. Preparations of lead always disagreed with the ulcer, warm applications soothed the sensations, but the swelling increased under them ; a carrot poultice was the only application that was found to give much ease.

In 1798 the patient came under my care ; the ulcer at that time was four inches broad, and six long, the edges of the surrounding skin thick and welted, and in several parts detached from the muscles for nearly an inch beyond the surface of the ulcer, which was sloughy, and had no appearance of healthy granulations, the discharge was thin, and so offensive, as to prevent his dining in company, the quantity was so great as to require dressing three times a day, the pain severe, and extending up to the thigh ; the calf of the leg measured in its circumference four inches and a half more than that of the healthy leg, which was full and strong from exercise.

Under these circumstances the use of the strips of adhesive plaister was adopted ; they were applied directly to the ulcer, and the calf of the leg

rubbed with a liniment of equal parts of the unguentum hydrargyri nitrati and olive oil, allowing him to use moderate exercise in his room. On the second dressing the appearance of the discharge and surface of the ulcer were much improved; in seven days the edges were on a level with the sore, the discharge small in quantity, and the granulations healthy. In a fortnight he was allowed to visit his friends, and take his usual exercise, which appeared to be attended with advantage. In a month the ulcer was only the size of a crown piece, and the calf of the leg was diminished two inches and a half in its circumference.

In this state he left town, and went a journey of 500 miles, rode every day on horseback, and the ulcer continued to diminish; at this time he had complaints in his chest, which induced his medical attendants to wish the leg not to be healed till an issue was made, and the strips of plaister were applied more loosely; under this treatment the ulcer again began to spread, but upon the original mode being resumed, it diminished in size, and healed up; the leg also became as small as the other.

The use of the adhesive plaister is particularly well adapted to ulcers in the thigh, which are not disposed to heal, but to spread into the cellular

membrane under the skin, forming sinuses; many of this kind occur in warm climates, and from the looseness of the skin and muscles are very difficult to heal. Three instances of ulcers in the thigh, which could not be cured in India, have healed in a short time under this mode of treatment, the patients using exercise all the time.

NO directions can be given, respecting which of these applications should be first tried in indolent ulcers, as a great deal must depend on what had been used before, without success; and in all such cases of long standing, many medicines must have been previously employed; the surgeon will therefore be guided by the history of the case, when it can be procured.

The adhesive plaister, the diluted nitrous acid, the solution of the *argentum nitratum*, and the *unguentum hydrargyri nitrati*, are the medicines on which it is reasonable to place the greatest dependence.

CHAPTER VIII.

OF ULCERS ATTENDED WITH SOME SPECIFIC DISEASED ACTION, WHETHER CONSTITUTIONAL OR LOCAL.

ULCERS are met with on the legs of persons who labour under constitutional diseases, and also of persons who have not any universal disease, but are in that state of body which induces parts, when injured, to assume some diseased action. Such ulcers do not properly come under any of the former heads, since they do not heal under any of the medicines which are found to answer in these different species of ulcer ; they are therefore to be considered by themselves.

When ulcers of these species are distinctly marked, they neither resemble, exactly, the irritable nor the indolent, but may be mistaken sometimes for varieties of the one, and sometimes of another ; there is, however, commonly an unhealthy appearance of the skin immediately surrounding the ulcer, which gives to the whole a diseased aspect, not seen in common ulcers.

The ulcers which take place in persons whose general systems are contaminated by the venereal disease, come more frequently under the eye of the surgeon than any others attended by a specific diseased action ; these are therefore mentioned as having the character of a diseased ulcer most strongly marked. Any such diseased appearance has been generally considered as a symptom of lues, and ulcers in which it is assumed have been too often referred to that cause. This has been productive of many serious mistakes in practice ; for these peculiar appearances arise from the parts being in a diseased state, but are not confined to one specific action, and take place in many other diseases, as well as the lues venerea.

As ulcers which are formed on persons, whose constitutions are affected by the lues venerea, in general require nothing but removing the constitutional disease by means of mercury, they cannot properly be said to belong to our present subject, which is more particularly the local treatment of ulcers. There are, however, many ulcers that were originally venereal, which after the virus has been destroyed, assume some new diseased disposition. This may happen in different ways ; it may arise from the state in which the parts were left by the original disease, or it may be the effect of a long continued course of mercury, and

in many cases a combination of both of them. In this view the venereal disease becomes a source of many diseased ulcers, some of which are met with on the legs.

Ulcers attended by disease occur also in persons of scrofulous habits, in those whose bodies are weakened by a long continued intemperance of different kinds, in those disposed to cancer, and in many instances arise from causes, with which we are little, if at all, acquainted. Were there any means of ascertaining all the diseases of the system, or of the parts, which produce these unhealthy or ill-conditioned ulcers; could they be distinguished with any degree of accuracy from one another, it would be right to consider them in some order connected with their causes or appearances; but this, till our knowledge of ulcers shall be greatly improved, cannot well be done. At present it will not be attempted to do more, than to state the medicines which may be used with advantage in ulcers of this description: pointing out, under the head of each medicine, such circumstances as may assist the judgment in determining which are the most proper cases for their use.

In ulcers in general, the principal dependance for the cure must rest upon the local applications;

as the complaint, although under the influence of the system at large, and varying in its appearance according to the peculiarities of the general system, is still a local complaint ; but when they arise from a specific disease, whether it is in the system or in the part, it is natural to suppose, that whatever medicine can relieve the specific disposition, will do it, in many cases, with equal advantage through the medium of the system, as when locally applied ; and even where used internally without the same degree of efficacy, it must, if it acts at all, be generally supposed to assist in the cure.

1. OF THOSE ULCERS WHICH YIELD TO MERCURY.

IT is not meant, as has been already stated, to consider those ulcers which are immediately connected with the venereal disease, but such only as are produced by other diseases of the general system, or of the parts, which yield to the effects of this medicine.

It was natural, when the beneficial effects of mercury in the venereal disease were first discovered, to suppose that every complaint which yielded to mercury must be venereal. It was, however, to be expected that observations, accu-

rately made, would soon ascertain that this active medicine is capable of producing salutary effects in many other diseases. Yet a long time elapsed before this was generally allowed.

Even now, when it is universally admitted that mercury, employed through the medium of the system, is the most efficacious medicine in inflammations of the liver, and in diseases of many of the other viscera, surgeons very unwillingly give it credit for the cure of ulcers that are not venereal ; but are inclined to suppose every ulcer that yields to such treatment arises from that disease.

This is by no means true ; for many ulcers, unconnected with the venereal disease, which received no benefit from other medicines, shall heal under a mercurial course, or yield to mercurial applications. In some cases the ulcer has remained stationary during the use of the mercury, but as soon as it was left off, has put on a more kindly appearance ; the mercurial course having produced so great a change in the constitution, as to destroy the disposition which had kept the ulcer from healing.

Such ulcers are, in general, in their appearance allied to the indolent kind, but have some diseased disposition peculiar to themselves. Mercurial

frictions are in these cases to be preferred, as it is a material object to impair the constitution as little as possible, by leaving the stomach undisturbed, and in a state to take nourishment.

There are ulcers on the instep and foot, with a very thickened edge, and a diseased state of the surrounding skin, approaching in their appearance to what is called Elephantiasis. These are frequently met with in servants of opulent families, where they had led an indolent life, and fed upon a luxurious diet. In cases of this kind fumigation with the hydrargyrus sulphuratus ruber has healed the ulcers, and resolved, in a great degree, the swelling of the surrounding parts.

The mercurial ointment, either made by calomel and hog's-lard, or the unguentum hydrargyri mitius, mixed with camphor, answers, in some cases, better than any other application.

Camphor, in general, renders the mercury more active, than when employed alone ; and the mouth has been frequently known to be affected by an application of this kind to a small surface, when the mercurial ointment, applied to a much larger extent, has produced no such effect.

The hydrargyrus muriatus diluted with water (to which a small portion of spirit has been added) in the proportion of a grain to an ounce, is a very useful application to many ulcers with a diseased aspect, more particularly those that are superficial, with a thickened edge, and appear to be principally confined to the skin.

2. OF ULCERS WHICH YIELD TO THE USE OF DIFFERENT PREPARATIONS OF THE CONIUM MACULATUM, OR HEMLOCK.

THE inspissated juice of the conium maculatum internally employed, is by some practitioners supposed to be entirely inert; while by others it is believed to have considerable powers over many diseases. From these opinions, so diametrically opposite, and both taken from actual observation, it would seem that its effects are very precarious. I confess myself to be by no means warm in its favour, for though it is sometimes of service in local complaints, it has so often failed, that much reliance cannot be placed upon it as an internal medicine, in diseases connected with surgery.

As an external application, the *conium maculatum* is a much more certain medicine ; and I do not hesitate to declare myself convinced, that there are cases of diseased ulcers on the legs which are cured by it more readily than by other means.

The ulcers which are most generally benefitted by it, from their appearance, would be classed with the irritable ; but there is in the surrounding parts a degree of thickening, which must be attributed to some specific diseased action. These ulcers are met with in the neighbourhood of the ankle joint, and the joint itself is enlarged. They sometimes occur upon the ligaments of the joint of the knee, but less frequently. From their situation, and the enlargement of the joint, they may be suspected to be scrofulous ; but from their sensibility they must be considered as an uncommon variety, if they really belong to that disease. In such diseased ulcers the *conium maculatum* takes off the pain, reduces the swelling of the joint, and seems to counteract the diseased disposition, whatever may be its nature.

In many ulcers that are truly scrofulous, the external applications of the *conium maculatum* are productive of the greatest advantage particularly in those attended with irritability.

The *conium maculatum* admits of being employed in three different forms, but only two of them are in general use.

The decoction is used as a fomentation, which is a very advantageous form, in those cases which are attended with pain; since the warmth assists in soothing and alleviating the symptoms.

It is used in the form of poultice, which has an advantage, as it admits of being much longer continued to the ulcer. The decoction of which the poultice is made should be much stronger than is commonly directed. Eight bundles, or four handfuls, of the dried herb, and a greater quantity of fresh leaves in proportion, should be boiled in a quart of water to a pint. A poultice made with a weak decoction has frequently been used without the smallest benefit; but when the strength of the decoction was increased, the ulcer shewed evident signs of amendment. Where the weight of the poultice proves oppressive to the limb, the decoction may be applied upon lint to the ulcer.

The inspissated juice of the *conium maculatum* admits readily of being formed into an ointment; but although several trials have been made with it, the results were not in its favour as an external application.

3. OF ULCERS WHICH YIELD TO THE APPLICATION OF SALT WATER.

Salt water is an exceedingly good application in many scrofulous ulcers, some of them being more readily cured by it than by other applications. The form of poultice is most commonly employed ; but in many cases of ulcers on the legs, keeping the part immersed in tepid salt water, for fifteen minutes, twice a day, appears to be preferable to any other mode. Several small ulcers have got well under this treatment in a fortnight, which had resisted the effects of internal medicines, and many different external applications, for six months ; nor did the ulcers return afterwards in the course of several years. The same mode has been used with large ulcers, and frequently with success. In scrofulous ulcers on the legs and feet, the salt-water poultice sometimes brings out pimples on the skin, so that the application cannot be continued. When this is the case, adding equal parts of decoction of poppies takes off this unpleasant effect ; and after the skin has been for some time accustomed to the salt water in a diluted state, it will bear the salt water by itself.

In such cases the foot or leg, at the times the poultice is to be changed, will receive benefit by being immersed for ten minutes in tepid salt water.

In some superficial ulcers, attended with a thickening of the skin, that have been in that state for months, the application of tepid salt water has produced a cure.

When there is an unusual coldness in the limb, without any tendency to mortification, the tepid salt water may be used with great advantage ; it brings a glow upon the skin, and rouses up the actions of the parts, so as to give an ulcer which had for some time been in an inactive state, a disposition to heal. These cases occur in tall thin men who are unhealthy, and advanced in life. They are also met with in young women who are very weak and unhealthy ; the whole system in such cases is apparently defective, not having sufficient energy to do more than carry on the functions of life, and being therefore unable to support the effects of disease.

Where the leg has a tendency to become anasarous, the application of tepid salt water is sometimes found entirely to remove that disposition.

4. OF ULCERS WHICH YIELD TO THE USE OF THE ARGENTUM NITRATUM.

There is a species of ulcer which does not appear to go deeper than the cutis, but spreads in all directions, producing ulceration on the surface of the skin, and frequently extends in depth through its whole thickness, or nearly so. This diseased disposition, whatever it is, does not remain in the parts which have ulcerated, but only on the edge of the skin, where the ulcer is increasing, for the surface first affected heals while the skin beyond is in a state of ulceration.

This description applies nearly equally well to the ulcers produced by three separate diseases, to all of which the soldier is peculiarly liable. One is a leprous eruption, most commonly met with among the impressed men brought from Ireland. Another is the consequence of buboes, which from their long continuance after the venereal virus has been destroyed, dispose the skin to take on this disease. The third is a disease of warm climates, commonly called the ring-worm. All of these, as far as my experience enables me to form an opinion, yield

more readily to the solution of *argentum nitratum* applied to them in different proportions, than to any other local treatment.

The disease met with among the Irish recruits is evidently of the leprous kind, as it is communicated by infection ; and, in those instances that have come under my care, was received by lying in bed with persons affected by it. Under these circumstances, a vulgar prejudice of its only affecting parts similar to those that had the disease, is very readily explained, for such similar parts in bed are the most likely to come in contact with each other.

It affects in general the breast, back, and legs ; it shows itself by a swelling like a large boil, with a pale red margin, extending for some way all round ; a reddish black scale forms on the top, the boil becomes extremely painful, and itches ; the scales fall off, exposing a foul ulcer, which discharges a foetid limpid fluid, and excoriates the surrounding skin, producing ulceration wherever it comes in contact : in this way it spreads over the greater part of the limb, and in some instances over a considerable portion of the body ; the parts first affected healing, while the disease is extending itself to those beyond.

These ulcers remain open sometimes three, four, or even six months, and then heal up, leaving a cicatrix similar to that which remains after the small pox ; those cicatrices often break out again in the spring in the same way that the disease first began, by forming a boil which becomes an ulcer, and spreads as it did before. In the very hot weather the pain and quantity of discharge are the greatest ; so that in the month of June the disease is the most virulent, and in the autumn subsides.

The symptoms are aggravated by the use of spirituous liquors, by feeding on salt provisions, and catching cold ; under any of these circumstances the ulcers are more inflamed and the pain more violent.

A number of cases of this kind came under my care in the year 1778, at the Naval Hospital at Plymouth, being brought from Ireland, among the men impressed for the use of the navy. Mild applications did not answer ; more stimulating medicines gave relief ; and the solution of the argentum nitratum appeared upon the whole to be the best adapted to this disease.

The disease in the skin produced by the effects of very irritable buboes, in constitutions broken

down by mercury, is very similar in its progress to that which has been described ; it is, however, more violent, the ulceration going deeper than the skin, which makes it more painful ; it spreads in some cases down the greater part of the thigh, and upwards almost round the body. The new skin which forms is readily disposed to ulceration, and the parts break out again very commonly in the spring. The discharge is of a thin acrid kind ; and as it excoriates the surrounding skin, there is little doubt but that it would affect the skin of another person.

In several cases of this kind, a variety of applications have been tried, but none of them agreed with the skin so well as the solution of the *argentum nitratum* ; all preparations of mercury did harm ; no unctuous application answered, so that it was always necessary to return to the *argentum nitratum* ; and by steadily persevering in its use, even in the worst of them, a cure was nearly effected, after a continuance of the disease for nine months, previous to its being applied.

The ring-worm is considered as a disease of warm climates ; and in the stage where an ulcer is formed, it certainly is confined to hot countries ; it is however, met with in a less degree in the warm

season in England. It is supposed to be infectious, and always to be caught in that way ; that it is so generally, there can be no doubt, but it also arises very commonly without any infection : this however, probably happens where the skin is very readily affected by the disease. That infection is not necessary for the production of the ring-worm, is proved by the following instances where it arose spontaneously.

In the summer 1779, while at Plymouth, I was consulted by an officer in the 75th regiment, at the desire of Mr. Venour, who was then surgeon to it, for a complaint on the skin of the upper part of the thigh, which appeared to be an uncommon disease, and did not yield to any applications that were made to it. I felt myself equally at a loss in what view to consider it ; mercury was used in different forms, but without any good effect, and in the autumn it very gradually went off.

About a year after seeing this case I embarked for the West Indies, and as soon as the ship had got within the tropics, found myself more oppressed and irritated by the heat than most of the Europeans on board, and to my astonishment found a similar complaint had taken place to that under which the officer had laboured at Plymouth. To allay

the extreme pain and itching it produced, cold water was frequently applied to the part, which kept it very cool ; under this treatment it went off, but but not for several weeks. Upon my arrival in the West Indies the disease returned, and was ascertained to be the ring-worm, so common in that country, which it was impossible for me or the officer in the 75th regiment at Plymouth, to have received by infection.

The ring-worm begins by an efflorescence on the skin, a little raised above the natural level, which spreads from a centre ; when the disease increases in violence, the margin of the circle is raised into a welt, and the surface contained within it appears scurfy ; the welt becomes covered with a scab which falls off, exposing an ulcerated ring, commonly not more than a quarter of an inch broad ; the ulceration spreads outwardly, and heals towards the centre, so that in general the breadth of the ulceration is nearly the same, although the circle is becoming larger and larger. It seldom becomes of any depth, being entirely confined to the cutis ; but in the worst cases it appears to extend through its whole thickness. In this stage it must be classed among the diseased ulcers, and among those of a very distressing kind, as the painful symptoms are exceedingly violent. The discharge is not pus, but

a thin watery fluid, of a very acrid nature, which, by its virulent properties, most probably extends the disease along the skin.

In the East Indies, the application in use to it, in this stage, is vinegar, saturated with borax. The natives employ the juice of some plants, which is sold as a secret medicine ; it is made by an Hindoo doctor at Vizagapatam, and sold at the different presidences in India. This medicine is of a very acrid nature, giving the patient excruciating pain, but removes the disease in a very short time.

The solution of the *argentum nitratum* answers in the milder cases, and there is little doubt of its being equally successful in those that are more severe.

5. OF ULCERS WHICH YIELD TO THE USE OF ARSENIC.

ARSENIC has been applied externally, in cases of cancer, by a number of empirics, as a caustic ; but from the violence of its effects, regular practitioners have in general been afraid to employ it in cases of surgery. It is, however, a medicine that may be used with safety, both internally and externally, in many diseased ulcers, with the greatest advantage.

Those ulcers in which I have been led to employ it are named, from the virulence of their disposition, *noli me tangere* ; and are very nearly allied to cancer ; differing from it in not contaminating the neighbouring parts by absorption, but only spreading by immediate contact.

Ulcers of this kind differ exceedingly from one another in their degree of virulence ; but they are all so far of the same nature, that arsenic in general agrees with them, and puts a stop to their progress, while they are aggravated by milder dressings.

I have been in the habit, for many years, of using arsenic externally to such ulcers, and its effects encouraged me to continue this practice, but did not authorise giving it internally with this view, lest the quantity necessary to be of any service might prove hurtful to the coats of the stomach. I was, however, induced to try it some years ago in St. George's hospital, in the following case, in which nothing could be well applied to the part itself.

A woman, 65 years of age, came into St. George's hospital on the 15th of June, 1796, with an ulcer on the side of the tongue, of three months continuance. It was foul, and spreading backwards to the root of the tongue, was extremely painful, and the ulcer had an offensive smell. It was out of the reach of external application. Finding no advantage from the use of the extract of the conium maculatum, which was given in large doses, it was thought right to try the solution of white arsenic in boiling water. She took, at bed time, five drops for a dose : this made her very sick ; next night three drops were given, which did not disturb the stomach ; this dose was continued for four successive nights, and as the stomach was very quiet, the number of drops was again increased to five, which were now found to agree very well. The ulcer was evidently better, and at the end of three weeks,

from the time the arsenic had been used, was much diminished in size. The dose was increased to six drops ; and, in a fortnight more, the ulcer was completely healed. The arsenic in this case could not act locally, as the ulcer was not situated upon a part of the tongue to which it could apply itself in the act of swallowing ; and if it had, the time of application must have been too short to produce much effect.

The success attending this case induced me to try the internal use of arsenic for an ulcer upon the side of the nose of a young woman, which had much the appearance of the *noli me tangere*. Nothing was externally applied ; the whole treatment consisting in the internal use of arsenic ; and in the course of a few weeks the nose was nearly healed.

These, not being cases of ulcers on the legs, may be considered as foreign to the present subject ; but they are here introduced, with a view to justify the internal use of arsenic in those ulcers on the leg, which receive benefit from its external application ; since they show, in the most unequivocal manner, that such practice is in itself not only safe, but capable of being attended with great advantage.

To ulcers of an untoward appearance on the legs arsenic may be used, both internally and externally, with success.

The cases to which this treatment is peculiarly applicable are those of the fungated ulcer. They are met with in the calf of the leg, and on the sole of the foot, shooting out a fungus from the surface, which is entirely different from common granulations: the new formed substance is radiated in its structure, the bottom of the ulcer being the central point, and the external surface (which is always increasing) the circumference. This fungus is very tender in its substance, and bleeds, if the slightest violence is committed on it. This disease in its origin sometimes appears like a scrofulous affection of the metatarsal bones of the foot; but the enlargement of the parts exceeds what commonly is met with in scrofula, ulceration takes place upon the skin, and a fungus shoots out, showing, for the first time, the nature of the disease, Whether such cases are originally scrofulous, and afterwards assume this new diseased disposition it will be very difficult to determine, but their remaining for a year before the fungus shows itself renders it highly probable. The same disease takes place in the testicle.

There appear to be two kinds of this disease, one which is poisonous, and capable of contaminating the lymphatic glands in the course of absorption ; the other not. There is no mode by which these two species can be distinguished in their earlier stages ; and the first kind is not to be removed by this, or any other application at present known : it is therefore only in the second kind that the arsenic is capable of effecting a cure. This medicine should, however, be used in all cases not ascertained to be poisonous.

The solution of arsenic, which I have always used, is made by boiling white arsenic in water for several hours in a sand heat, and taking this saturated solution for use. When given internally, the dose is from three drops to ten ; when externally applied, a dram is diluted with lb. ij of water ; and this solution is gradually made stronger, as the parts become accustomed to it, till it is of double strength. This solution is either applied on lint, or made into a poultice.

In ulcers connected with diseased bone, which prevents them from healing, the luxuriant granulations rise up round the orifice leading to the bone, and require being destroyed by some escharotic ; the solution of arsenic answers this purpose better than any of those in common use.

CHAPTER IX.

OF ULCERS ATTENDED WITH A VARICOSE STATE OF THE VEINS OF THE LIMB, AND THE ADVANTAGES DERIVED IN SUCH CASES FROM INCLUDING THE VENA SAPHENA IN A LIGATURE.

ULCERS occur in many patients, but more frequently in tall people, on the inside of the leg, just above the ancle. They have their origin from some accidental cause, and when once they take place are difficult of cure, and almost always break out again.

This ulcer resembles in its appearance those of the indolent species, rather of a mild kind ; but if the state of the limb is examined, it will be found that the branches of the superficial veins which form the vena saphena are, many of them, preternaturally enlarged, and the vena saphena itself is extremely large. It is this enlargement in the veins which prevents the ulcer from being healed.

This species of ulcer is seldom very deep ; when it spreads, it is generally along the surface ; its shape

is commonly oval, the ends of the oval pointing vertically. The edges of the surrounding skin are commonly neither thick nor irregular, but are imperceptibly lost in the ulcer. The pain which it gives is seldom from the surface, for pressure does not increase it ; but there is an aching uneasy sensation in that part of the leg. This pain is deeper seated than the surface of the ulcer, and very often extends up the leg in the direction of the veins ; and is increased to a very great degree, if the limb is long kept in an erect posture.

The ulcer commonly increasing in the course of the veins encourages an opinion, that inflammation and ulceration in ulcers in general run along the internal surfaces of the smaller veins, which open upon the ulcerated part, and that this is the common cause of their increase. There does not appear any other obvious reason why the ulceration should extend upwards, contrary to what happens in ulcers on the leg in general, especially as it will be found, in the course of these observations, that there is, at that time, no disease whatever in the part itself.

That ulcers do, in some instances, spread in the course of the veins, may be illustrated in the liver, where the veins coming from the ulcer have been found to have their orifices perfectly open ; the ad-

hesive inflammation not having united their sides together, and the internal surface for some way appearing inflamed.

The enlargement of the veins of the leg, particularly the superficial veins in middle aged and old people, happens so frequently, that no one who has attended to the subject can be ignorant of it. When once this disposition in the veins has begun, it generally goes on increasing, and the limbs become less able than usual to bear violent exercise, or to sustain the body long in the erect posture. This is so often met with where there are no ulcers on the leg, that it must be considered as a diseased relaxation of the coats of the veins, of which the immediate cause is, at present, unknown.

Although ulcers on the legs, therefore, cannot be said to produce this enlargement of the veins ; yet, when once an ulcer takes place in such a limb, it seems, by making it weaker, to increase that disposition, or at least to render the progress of the complaint more rapid.

An ulcer, in whatever way produced, upon a limb in this state of enlarged veins, is more difficult to heal than otherwise it would have been ; is more liable to break out again after it has cicatrized, and

too often cannot for many years be made to heal at all.

This species of ulcer is very common in the army. I have very often seen it in non-commissioned officers, and am led to believe that grenadiers are, from being taller, more liable to it than the men in the batallion or light infantry companies. It is an ulcer which external applications rarely can remove ; and many men, on this account, are either invalided, or, from a consideration of their former services, or, of some particular good qualities, are placed in situations unconnected with the effective strength of their regiments. The disease in the veins, which prevents those ulcers from healing, is frequently brought on by the fatigues and changes of climate to which soldiers are subject, and by which their general health is sometimes greatly impaired.

The officers in the army, from the same circumstances, are more liable to this complaint than any other description of men in the higher orders of society. In them, where no accidental cause has produced an ulcer, it is not noticed ; and when ulcers have been formed, they may, by great attention, be healed, so as only to break out occasionally ; which, when it happens, is supposed to arise from the im-

paired state of their bodily health, being seldom referred to the real cause.

This species of ulcer, although difficult to heal, has not been considered the opprobrium of surgery, because in general the ulcer is not very large, nor is its appearance such as to alarm the mind of either the patient or the medical attendant. But, from its not getting well under the use of different medicines, it has been productive of considerable embarrassment to the mind of the surgeon, and has taken from him the necessary confidence in the treatment of other ulcers, more within the influence of external applications, so as materially to retarded the improvement of this branch of surgery.

This happened to myself, and many were the mortifications met with in my attempts to heal such ulcers, before the peculiarity which renders them a distinct species was ascertained, nor was it unnatural to draw conclusions very unfavourable to the healing powers of the medicines which had been used without effect, while ignorant of the circumstances by which they had been counteracted.

Cases of this kind show, in the clearest point of view, that we are not wholly to give up the use of medicines, because in some cases they have not an-

swered, since the want of success most probably arises, not from any inefficacy in the medicine, but from our misapplication of it.

It is this species of ulcer, which, from its great backwardness to heal, has given the idea of its being a natural drain from the constitution, which it was improper to dry up ; and the strong argument advanced in favour of this opinion has been, that whenever it was healed, it broke out again, and the patient was full as easy while the ulcer was open, as when it was closed, if not more. This may at first appear extraordinary, but can be readily explained ; since the pain, in such cases, arises more from the distended state of the veins, than from the ulcer ; and the patient will naturally be led to use more exercise when the ulcer is healed, which will keep the veins in a more uneasy state.

This is the species of ulcer in which tight bandaging to the leg is particularly applicable, and rolling the whole limb, from the toes to the knee, is found to be attended with the greatest advantage. It is to be understood, that the tight bandaging is not immediately applicable to the ulcer itself, as it will appear that it is immaterial in what way the management of the ulcer is conducted ; and it is probable that the success of tight bandaging in ul-

cers attended with varicose veins, has led to the use of compression in other species of ulcers, wherein it has proved hurtful ; not being suited to the state of the limb, which often is unable to bear any thing tight upon it.

Soldiers who have the slightest disposition to a varicose state of the veins, whether there is an ulcer on the leg or not, should have their gaiters so made as to answer the purpose of a tight bandage, which may be readily done by having them very accurately fitted to the leg ; for this purpose those made of woollen cloth will answer best, as its elasticity allows it to yield to the motion of the muscles, and always preserves an uniform compression.

A laced stocking is a most useful application, and if it could be worn without inconvenience, probably no other mode of treatment would be necessary ; but it too often happens that the patient is unable to bear the necessary degree of general compression for any length of time, and therefore after using it for some weeks, is obliged to leave it off.

Having found, in some cases of ulcers under these circumstances, that no local treatment whatever would produce a cure, and that the ulcer healed under the simplest applications when the laced stocking

was used ; my attention was very naturally diverted from the consideration of the ulcer itself, to that of the veins of the leg.

The case which most particularly impressed my mind with this idea, was the following.

A. B. a workman employed by Mr. Ramsden the optican, had an ulcer on the leg, for which he was admitted into one of the Royal Hospitals in London ; he remained there for several months, but the ulcer baffled the skill of the surgeon to whose care the patient was entrusted, and he left the hospital nearly in the same state in which he entered it. As the man was a valuable workman, Mr. Ramsden was very solicitous about his recovery, and begged me to give him my advice. The man happened to have been standing for some time before his leg was examined, which gave me an opportunity of perceiving the veins to be extremely varicose, and preternaturally enlarged ; the use of the laced stocking, was therefore advised as a support to the veins ; to this he immediately had recourse, and very soon got well, the ulcer being dressed with the most simple ointment.

This case, with many others, led naturally to the adoption of the laced stocking, not as a general prac-

tice in all old ulcers on the leg, but in all those where the veins of the limb were enlarged ; it also prepossessed me in favour of tight bandaging in cases of ulcers on the leg.

On putting it to the test as a general practice, it appeared, that there are many people whose legs can neither bear the laced stocking nor a tight bandage of any kind, and that instead of deriving advantage from such applications, the ulcer, in these subjects, becomes worse ; or if it gets better, the limb becomes uneasy that the patients are obliged to leave off the bandage.

As an instance of the first kind, the following case is mentioned. A gentleman put himself under my care for a small ulcer on his leg, which he had in vain attempted to heal by the common applications. An ointment composed of one part of the unguentum hydrargyri nitrati mixed with three parts of hog's lard, was applied to the ulcer, and the leg rolled as tight as the patient could bear. He had no sleep all night, and the ulcer looked worse next day. This was not attributed to any part of the treatment, and therefore it was continued. The ulcer became still worse : he now mentioned that the tight bandage gave pain, that 15 years before he had an ulcer on the same leg, that Mr. Moffat the

surgeon had bound up in the same way, and that the effect was the same. The bandage was left off, and in a few days the ulcer got quite well. Since that time several instances of the same kind have occurred to me, and indeed there are many people who in health, cannot bear the slightest compression on the leg.

From these examples it is evident that no absolute rule of practice can be laid down for all cases ; the peculiarities of constitution being such as to require being considered apart. As, however, those patients who cannot bear tight bandaging at all, are but few, they must rather be looked upon as exceptions, and uncommon cases, than as affording any argument against the general treatment ; but it does also happen that even in those cases where the veins are enlarged, the limb too often cannot bear compression for any length of time.

As the tight bandage and laced stocking, the only modes of compressing the veins recommended to us, and sanctioned by general practice, in many instances cannot be adopted, and in others are attended with great inconveniences, and consequently are seldom uniformly complied with, it is right to consider in what other way the same effect can be produced.

The remarks which have been made upon tight bandaging must, be familiar to every one who has considered this subject with any degree of attention. They have not been stated under the idea of conveying any new information ; on the contrary, they are rather meant as a justification of my not having been satisfied with that practice in all cases. They show, at the same time, that it had not been passed over, but had a fair trial given it ; and after a careful investigation of its effects, it had been given up, and the failures which occurred had led me to endeavour to find out a substitute, which might be free from its disadvantages.

In considering the mode by which the varicose veins prevent an ulcer from healing, it appeared to be most readily accounted for in the following manner. That in consequence of the size of the vena saphena, and its numberless convolutions, the return of the blood from the smaller branches is so impeded, as to retard the circulation in the smaller arteries, and to interfere with their action in forming healthy granulations. This observation is, in some measure, confirmed by the following circumstance. In cases of ulcers attended with weakness, on the lower part of the leg, the granulations while the patient lies in an horizontal position, appear florid and healthy ; but if he is made to stand up, and continues in that

posture only for a few minutes, they become of a deep dark-red colour, and frequently bleed. This change can only arise from the increased resistance which the blood encounters in its return through the veins of the limb, when the body is erect.

An enlargement of the veins produces also another effect. The coats of the vessels and the valves become thickened, which renders the valves less pliant, they do not occupy the whole area, and therefore are no longer of any use ; and from this defect the whole length of the column of blood in the vena saphena is, in the erect position, pressing upon the contents of the smaller veins, so as to dilate them still more and more, and keep the limb always in a weak state.

Under these circumstances, it appeared to be an object of no small importance to take off a part of the pressure of this column of blood, which would probably allow the parts lower down to be in a more easy state, and better able to recover themselves ; it might also prevent the veins from being still more dilated, and so far stop the progress of the disease in these vessels.

The only mode of doing this, that suggested itself, was that of making an artificial valve, by pass-

ing a ligature round the vena saphena, as it passes over the knee joint, and obliterating the vein at that part. The reason for applying the ligature upon this particular portion of the vein is, that just at that part the branches from the different parts of the leg unite and form a common trunk, and as it is the preternatural enlargement of some, or all these branches, which constitutes the principal part of the disease, the most effectual mode of taking off the weight of the column of blood contained in the common trunk will be by obliterating it, as near as possible to the termination of those branches into it.

The practice of taking up veins is not new ; it was in use by the older surgeons in cases of varicose veins, and in one case was practised by Mr. Hunter. In that particular case several branches were separately taken up, which increased the pain of the operation, and made it more tedious ; but the man was much benefitted by it. In that instance this mode of treatment was adopted with the view of alleviating the disease in the smaller veins, without any reference to the cure of ulcers on the leg : and in the practice of the older surgeons, if the dilated branches only were taken up, it could

not succeed. Its failure was probably the cause of its falling into disuse.*

The present intention, as well as the mode of effecting it, is somewhat different. The principal object is the healing of the ulcer ; and this will be found of no small consideration, when it is known that ulcers of this description, although not so painful and troublesome as ulcers in common, are attended with an uneasy sensation in the course of

* “ The cure of these ulcers with varix is either real or palliative. The real or perfect cure proposed by the ancients, I have delivered in the chapter of a simple varix : it is by making an incision in the skin, and taking up the vein, and tying it, &c.* But this way hath not been admitted (to my knowledge) amongst us ; nor have I often seen that a varicose ulcer could be cured by cutting off the branch leading to the ulcer, there being commonly more veins concerned in it.” Wiseman’s *Chirurgical Treatises*, octavo. Vol. I. page 325.

* The following is the passage referred to in the preceding quotation :

“ In simple varix, according to the ancient practice, you are to proceed by section, dividing the skin, and separating the teguments ; and having raised the varicose vein, you are to pass a ligature above and another beneath it, making a delegation of them ; then slit the vein, cast out the gross blood, and afterwards digest and heal it as is after said in an aneurisma.” Vol. I. page 108.

these dilated veins which disables the patient from bearing fatigue, this uneasiness being much increased by standing long, or walking. That these symptoms are peculiar to ulcers in this state of the limb is evident, for within a few hours after the vena saphena has been taken up, the symptoms disappear, and the patient is led to take notice of the distress it before gave him, and to express his sense of the suddenness of its removal.

Another object is to prevent an increase of the dilatation of the veins of the limb ; which, when nothing is done to prevent it, are constantly growing larger ; and after they have arrived at a certain size, become very painful on the smallest exertion, or continuing long in an erect posture, even where there is no ulcer.

The mode of practice, which is now brought forward, had been followed for five years, when the first edition of this work was published ; and during that period opportunities had occurred of seeing its effects in twelve different instances. All the cases, except the first, were under my care in St. George's hospital, and many of the patients submitted to this mode of treatment, from seeing the good effects of it upon others. Since that time my

opportunities of seeing its effects, have been much increased.

As every thing connected with the operative part of surgery carries along with it a certain degree of dread to the mind of the patient, any mode of treatment, however tedious, and even uncertain, is preferred by many to an operation ; although the sufferings, when justly estimated, are too often ten times greater in obtaining a cure without such operation, than with it. Under this prejudice, the operations of surgery must continue while they are considered abstractedly ; but when the diseases for the relief of which they are performed are taken into the account, and the pain and distress of the one is balanced against the other, the prejudice will be removed ; and what, upon a superficial view, was considered as cruel, will be found to be humane. The surgeon therefore, who discovers an operation by which a distressing disease is removed, should be viewed in the same light as any other benevolent man, who prevents or removes the sufferings of a number of his fellow creatures.

The operation of taking up the vena saphena is extremely simple, may be performed in a very short time, and is attended with less pain, if we may judge from the account of those on whom it has

been performed, than it would be natural to expect. My attention has been directed in every case in which it has been performed, to render it as little painful as possible, and the mode which appears to me the least so, is the following.

As the veins are only turgid in the erect posture, the operation should be performed while the patient is standing; and if placed on a table, upon which there is a chair, the back of the chair will serve him to rest upon, and he will have the knee joint at a very convenient height for the surgeon. The leg to be operated upon, must stand with the inner ankle facing the light, which will expose very advantageously the enlarged vena saphena, passing over the side of the knee joint. While the patient is in this posture, if a fold of the skin which is very loose at this part, is pinched up transversely, and kept in that position by the finger and thumb of the surgeon on one side, and of an assistant on the other; this fold may be divided by a pointed scalpel pushed through it with the back of the knife towards the limb, to prevent the vein being wounded; much in the same way that the skin is divided in making an issue. This will expose the vein sufficiently, but there is commonly a thin membranous fascia, confining it in its situation; and when that is met with, the vein had better be laterally disengaged by the

point of the knife. This is most expeditiously done by laying hold of the fascia with a pair of dissecting forceps, and dividing it; for it is difficult to cut upon parts which give little resistance, and there is a risk of wounding the vein. After this, a silver crooked needle, with the point rounded off, will readily force its way through the cellular membrane connected with the vein, without any danger of wounding the vessel, and carry a ligature round it. This part, or indeed what may be considered the whole of the operation, being finished, the patient had better be put to bed, so as to allow the vein to be in its easiest state before the ligature is tied, and then a knot is to be made upon the vein; this gives some pain, but it is by no means severe. The edges of the wound in the skin are now to be brought together by sticking plaster, except where the ligature passes out, and a compress and bandage applied, so as to keep up a moderate degree of pressure upon the vein, both above and below the part included, in the ligature. The inflammation, in general, is very trifling; it does, however, in particular cases, extend for some way in the course of the veins under the skin; but even where this has happened in the greatest extent, it has been attended with no bad consequences. The ligature comes away about the ninth or not later than the twelfth day, after which the parts commonly heal up.

As it answers no good purpose for the ligature to remain so long, and only protracts the cure, I have been in the habit of removing it on the fifth day, which saves the patient five or six days of confinement. The mode of removing the ligature is very simple ; the vein is so near the skin, that the knot is readily brought into view, and the ring of the ligature, which at the time of the operation was filled up by the vein, is now become loose, its contents having been considerably diminished by absorption, so that the point of a pair of scissors can be readily passed through it, by which it may with ease be divided, and the whole of the ligature brought away.

Cases occur in which there is a smaller vein running parallel to the vena saphena. This, when the vena saphena has been taken up, afterwards becomes enlarged, and continues the disease ; when that is the case, this vein also must be taken up. These circumstances ought to be attended to in the first examination of the disease, as sometimes the two veins are so close together, that they may both be included in the same ligature.

This enlargement of the vena saphena is sometimes combined with an enlargement of the branches of the vena saphena minor, or posterior, that passes up behind, between the two hamstrings ;

when this is the case, the disease is in an uncommon degree of violence, and in such instances would be less likely to be attended with success, unless both venal trunks were taken up.

In two or three cases there has been an enlargement of the branches of the vena saphena minor, without the vena saphena itself being at all affected; the principal convolutions of the enlarged veins were on the calf of the leg, and on the outside of the foot, just below the outer ankle. In these instances there was no ulcer, and therefore no very forcible reason could be urged to induce the patients to undergo an operation, nor was there the same chance of success, the use of a laced stocking was therefore recommended; and in case that should not answer, it was explained to them, that they had it in their power afterwards to have recourse to taking up the venal trunk.

The enlargement of the vena saphena minor, is rather mentioned as an uncommon occurrence, than as a case to be relieved by surgical treatment; that when it is met with, it may be distinguished from the enlargement of the vena saphena, the subject under consideration.

In one case where there was an ulcer, and only the branches of the vena saphena minor enlarged;

the ulcer was situated more posteriorly than is usually met with, and the branches upon the calf of the leg were in an extremely varicose state, forming large projections, the trunk itself was very large, while the vena saphena was nearly of its natural size. The patient was a young woman of a very delicate constitution, but in good health; she was twenty-five years of age, and suffered so much pain in the ulcer, and in the course of the enlarged branches, as to be unable to walk or stand for any length of time, unless the limb was supported by bandage.

As instances occur, in which, though the immediate branches of the vena saphena are affected, the disease extends no farther; and as the same thing happens, though less frequently, to the branches of the vena saphena minor; and in other cases, the disease is found to take place in both, it becomes necessary to explain in what manner complicated cases may be distinguished.

The branches of the veins, passing up from the foot to form these two venal trunks, anastomose very frequently and freely with each other; it is therefore impossible to say precisely to which of them the collateral branches belong.

When the vena saphena becomes enlarged, many of the common branches, and some of those belonging to the posterior trunk, will consequently be affected; and vice versa, when the vena saphena minor is enlarged. This, however, is not to be considered as implicating both veins in the disease, for the branches of one of them are only affected in a secondary way by their connection with the other. Whatever number of the venal branches of the lower part of the limb is enlarged, if this enlargement in those of the upper part of the leg only extends in the course of one of the venal trunks, the disease should be referred to that trunk, whichever it is, as it is evident that the other, from its remaining of the natural size, can have had no part in the disease.

CASES

OF THE VENA SAPHENA INCLUDED IN A LIGATURE, TO PROMOTE THE CURE OF ULCERS ON THE LEG.

AS this operation is a new one, so far as it is performed for the purpose of disposing ulcers to heal, the mode which appears to me the most unexceptionable, of laying the facts ascertained respecting it before the public, is giving a plain narrative of the several cases which have come under my care ; that they may become documents upon this subject.

CASE I.

A MAN, sixty years of age, had for many years gained his livelihood by going on messages, having been rendered unfit for more laborious employment by a large ulcer on the left leg, just above the inner ankle. The complaint was of twelve years standing; it had been sometimes much better than at others, but had never been well during the whole of that period.

In the year 1792, it became so bad as to confine him entirely. It was at this time I first saw him. Upon examining the limb, the veins were extremely large and varicose, and the trunk of the vena saphena, at the knee, appeared almost the size of the little finger. The size of this vein led me to the idea of taking it up at that part, with a view of relieving the lower branches from the pressure of the blood, which appeared to be the cause why the parts remained weak, and the ulcer could not be healed. My opinions upon this subject were explained to the patient, and if he thought it worthy of trial, he was told of my readiness to do it for him. The man's desire to get well was such as to induce him to embrace the

offer of any mode of treatment which afforded the smallest chance of a cure. The vein was taken up in the way that has been mentioned. He complained of very little pain, no improper degree of inflammation was brought on by the operation, the ligature came away in nine days, and in fourteen days the wound was healed.

The ulcer upon the leg was dressed with dry lint ; it put on a better appearance on the second day after the operation ; on the fourteenth it had diminished in size one half, and in twenty-eight days was completely healed. He was also freed from a pain in the course of the veins of that leg, to which he had been subject for many years, whenever he used any exercise.

He returned to his business of carrying messages, and called upon me a year after, perfectly well ; his leg having continued sound.

CASE H.

Sarah Stapleton, a cook and housemaid, aged twenty-one years, in January 1794, was admitted a patient into St. George's hospital, on account of an ulcer upon her leg. The ulcer was situated upon the inside of the leg, a little above the inner ankle, had been of several months continuance, and was extremely painful, more particularly so at night, depriving her of rest. The pain was not confined to the ulcer, but seemed to run up in the course of the veins; this was much increased after fatigue, or having been obliged to stand for any length of time, and consequently was greatest at night, after the labour of the day, which, from the nature of her situation, was very great.

On examining the limb, the branches of the vena saphena were found to be much enlarged and varicose. Under these circumstances it was proposed to make a ligature upon the vena saphena. In performing the operation, which was done in the erect posture, she complained of great pain in the ulcer, from being obliged to stand firmly on that leg; but as soon as the ligature was tied round the vein this pain ceased, and never

afterwards returned. In the time of the operation a smaller vein was observed running parallel to the vena saphena, which afforded a reasonable suspicion that the disease might recur : as, however, this was uncertain, the circumstance was only mentioned, and it was left to herself to determine whether she would have it taken up at that time, or take the chance of its enlarging, and whenever it did so, have a repetition of the operation. She preferred the last. The ligature came away in ten days, the ulcer on the leg healed up entirely in three weeks, and she was discharged from the hospital perfectly well.

She went again to service, in the capacity of cook, in a small family ; and from the nature of her business was much exposed to the fire, and obliged to stand a great deal, which made the veins of that leg swell and increase in size ; but the leg continued sound, and she had no return of the pain. Fifteen months after the vena saphena had been tied, a vein in the place where the ulcer had formerly been situated burst, and bled freely ; it stopped, however, of itself ; the quantity of blood which was lost alarmed her considerably, and made her return to the hospital for advice.

Upon examining the vena saphena, at the part where the ligature had been applied, two very

large veins were discovered ; so that there must have been, at the time of the operation, two small branches, one on each side of the vena saphena ; one of these only had been observed at the former examination. These two veins were now included in one ligature. This was done April 17, 1795. Tying the veins gave considerable pain, which did not entirely go off for two days, and then subsided ; on the 22d, the ligature was removed, after which the parts were much easier, and in a week the wound healed up.

The ligatures which are applied to secure vessels in all operations, while they remain in the wound, act as extraneous bodies, and keep up a degree of irritation, which, although it differs in almost every two patients, is generally considerable : this is known by the relief the patient experiences after their removal. The leg for a time gave the feel of weakness, and swelled when walked upon for a number of hours ; but this gradually went off, and by the beginning of May, she left the hospital.

The swelling of the leg for a few weeks after the operation, is a symptom which occurred in several instances.

CASE III.

A man, sixty years of age, in the year 1794, was admitted into St. George's hospital, on account of an ulcer upon his leg, of many years standing. It proved to be one of those attended with large and varicose veins ; the connection between the two complaints was explained to him, and it was proposed to take up the vena saphena, which he readily consented to have done. In this case the vein was strong in its coats, and rolled more loosely in the cellular membrane than it had been found to do in younger patients. It was readily included in a ligature. The ulcer, immediately after the operation, put on a more kindly appearance ; it healed more slowly than in the two former cases. This probably arose from the man's age ; but in a month's time it was perfectly well. It is to be remarked, that no dressings were made use of, in this or any of the other cases, but dry lint and white ointment, unless they are particularly mentioned.

CASE IV.

Richard Pinkley, thirty-four years old, had complained of a swelling of one of his legs for ten years, during the latter part of which period, the veins had gradually enlarged, and an ulcer had broke out a little above the inner ankle, which healed up, but broke out again. This happened several times; and at last the ulcer became so large and painful as not to admit of being healed, which induced him to become a patient in St. George's hospital. He was admitted under my care, and the operation of taking up the vena saphena was proposed as the only means of making the leg continue sound. To this he readily acceded. The operation was performed on the 10th of April, 1795. The vein was very large, and on the third day a swelling came upon the leg; on the sixth the ligature was removed, the inflammation increased, and extended itself in the course of the venal branches. It was evidently of the erysipelatous kind; it also spread up the thigh, and the ulcer put on a foul appearance; on the tenth, the inflammation began to subside; on the twelfth it was still more diminished, but the swelling re-

mained the same ; the ulcer now put on a better appearance. On the eighteenth the inflammation was very much gone off ; and by the twenty-eighth day, from the operation, the man was perfectly well.

The erysipelatous inflammation which attacked the leg and thigh is to be considered, in some measure, as accidental, and not connected with this particular operation ; it is very frequently met with in all hospitals, and in the spring of the year we find, at St. George's hospital, that a great number of the surgical patients are liable to it, whether their complaints arise from accident, operation, or ulcers of long standing. It appears to be occasioned by some peculiarity in the state of the air at that season of the year ; and when the erysipelatous inflammation had once begun, the irritation from the ligature would direct it along the course of the vein.

CASE V.

A man, sixty years of age, whose business was that of an out-door porter to a banking house, in June, 1794, came into St. George's hospital with an ulcer upon the inner side of the right leg, of several years standing. This ulcer had been repeatedly healed, but always broke out again; and, at the time when he came into the hospital, rendered him unfit to bear the fatigue of his business. The veins of the limb were much enlarged, and consequently extremely varicose. It was proposed to tie the vena saphena, to which he assented. The operation was attended with little pain, and the ligature came away the ninth day after the operation, and on the fourteenth the wound was entirely healed. The hospital now disagreed with his general health; this he attributed to the confinement, and the want of his usual exercise, having been accustomed to be much in the open air. He lost his appetite; and the ulcer on the leg spread to a considerable size. Under these circumstances he was moved into pri-

vate lodgings. As soon as he left the hospital he began to recover, and, in less than six weeks from the time of the operation, the ulcer on the leg was entirely healed, and he was discharged cured.

CASE VI.

Anthony Kennedy, a footman, aged thirty-five, in the year 1793, about the month of April, found that the veins of his left leg had become unusually large; they continued to increase in size, and in six months an ulcer broke out just above the inner ankle. This ulcer spread, and in eight weeks was so large and painful, that he was obliged to leave his place, and go into the infirmary at Dumfries, where he continued five months; during which time his leg got quite well. He returned to his master, and went with him to Bath, where the ulcer broke out again. The veins of the right leg began to enlarge in the same way, and an ulcer broke out upon the same part of that leg. For these two ulcers he was under the care of several surgeons of eminence in Bath for five months, without receiving benefit: he then went into the Bath infirmary, and was there six months, and both the ulcers got well; but in two months time they both broke out again, and were more painful than they had ever been before. He was now received into the Bristol infirmary,

and continued there six months ; the ulcers, however, could not be again healed ; and he was told by the surgeons, that their not being able to heal them was of no consequence, as they would break out again ; and therefore he could not have a permanent cure. Under these circumstances he came to London, and applied to me for assistance ; by my advice he became a patient in St. George's hospital, where he was received on the 5th of February 1796.

At this time there was an ulcer on each leg, which had a foul appearance ; the branches of the vena saphena of both legs were very much enlarged and varicose. It was explained to him that the ulcers were prevented from healing by this enlargement of the veins ; and it was proposed to take up the vena saphena of each leg, assigning the reasons, and describing the advantages which might be expected. He very readily consented to have any thing done which was thought necessary ; and on the 9th of February the vena saphena of the left leg was taken up. On the 16th the ligature was removed, the wound had a very healthy appearance, and the ulcer was evidently better. On the 19th, the vein of the right leg was treated in the same way, and the ligature was removed on the 23d. He felt very little pain in either limb during the opera-

tion, and had none afterwards. The ulcers, to which the only applications were dry lint and simple ointment, made a very rapid progress towards healing. On the first of March, the wound made in the first operation was healed, and on the eighth, that made by the second had also healed. On the 26th, the ulcer on the left leg was skinned over, and that on the right leg nearly so; this last, however, was a fortnight longer before it healed. About the 14th of April he was discharged from the hospital.

CASE VII.

Robert Bradbury, nineteen years of age, a gentleman's servant, was admitted into St. George's hospital June 23d, 1796, with an ulcer upon his left leg. The following is the history of the case. The veins of that leg had been enlarged for many years, but he had felt no great uneasiness from this circumstance till a year and a half before ; when, in consequence of a kick upon that leg, just above the inner ankle, an ulcer took place, which healed and broke out again. This happened several times, and at every return it put on a worse appearance, and was longer in healing ; and, at the time when he came to the hospital, it was not at all disposed to heal.

Under these circumstances the state of the veins was considered as the cause of the ulcer remaining in an indolent and unhealthy state, and it was proposed to take up the vena saphena, as a means of producing a permanent cure. On the 26th of June the operation was performed, on the 30th the ligature was removed. On the 4th of July the veins

were evidently diminished in size, and the ulcer on the leg was entirely healed. On the 8th the wound made in taking up the vein was so nearly well as to be of no consequence, and he was allowed to leave the hospital, and return to his master.

Five months after there had been no return of the ulcer.

CASE VIII.

James Peasnell, a footman, twenty-eight years of age, had an ulcer on the inner ankle of the left leg, for twelve weeks, with a varicose state of the branches of the vena saphena of that leg. This he attributed to the cramp, and thinks that the veins began to increase sixteen years ago. This enlargement of the veins had given him no pain, unless they were much pressed, or when he was carrying a heavy burthen. He was admitted into St. George's hospital, under my care, on the 9th of October, 1796, for the purpose of having the vena saphena taken up by ligature, with a view of making the ulcer heal, and relieving the uneasy symptoms produced by the enlarged state of the veins.

He had been a patient in the hospital a month before, but no mode that was adopted succeeded in disposing the ulcer to heal, which induced him to apply for this mode of procuring relief. On the 10th of October the operation was performed; on the

14th, when the veins were pressed by the finger, they did not give the same pain he had formerly felt, and the ulcer on the ankle had a better appearance. On the seventh day the ligature was removed, and the wound superficially dressed. On the ninth day he had an attack of fever ; on the tenth was rather better : but an erysipelatous inflammation came upon the wound, and extended down the leg, in the course of the cellular membrane : but the branches of the vena saphena were not affected by it. On the fifteenth there was an abcess formed in the calf of the leg ; he was still very much indisposed in his general health ; on the nineteenth a second abcess formed, a little below the other, and the two openings communicated with one another, the cellular membrane under the skin having been destroyed.

From this time he became daily worse ; on the thirtieth day he had a cough, loss of appetite, and hectic fever. As it was conceived these symptoms arose from the air of the hospital disagreeing with him, it was proposed he should be immediately removed into private lodgings, but from several circumstances this was not done till the fortieth day. He was no sooner out of the air of the hospital than he was able to sleep, and recovered his appe-

tite ; and in three weeks time his general health was re-established, all the ulcers formed by the different abscesses were healed, and he returned to his master.

CASE IX.

John Baker, a labourer, aged sixty-two, twenty years ago, by accident, cut one of the branches of the vena saphena with a bill; the wound very soon healed, but the branches of the vein became enlarged and varicose, and have occasionally been painful ever since, when pressed.

In August, 1796, he received a hurt on his inner ankle, which formed an ulcer; he went on for two months making use of different applications, but at the end of that time it became so large and painful, that he was induced to apply for relief at St. George's hospital. He was admitted on the 8th of October. Upon its being explained to him that the ulcer was prevented from healing by the enlargement of the veins of the leg, he readily submitted to any operation which would facilitate the cure of the ulcer.

On the 10th the vena saphena was taken up; soon after this operation, the pain which he had felt in the vein, when pressed, gradually became less, and the

ulcer had diminished in size. The only dressing employed was dry lint. On the seventh day after the operation, the ligature was removed, and the wound looked very well ; it continued healing for several days, after which it inflamed and spread, the ulcer on the ankle taking on the same disposition. Under the use of the carrot poultice this inflammation subsided, and the parts again put on a healing appearance. At the end of five weeks the man was discharged, the wound made in taking up the vein being completely healed, and the ulcer on the ankle so very small, that he could not be induced to remain longer in the hospital.

In these cases the vena saphena was taken up on account of ulcers on the leg, proving so obstinate under every mode of treatment which could be devised, that the patients readily submitted to the operation, with a view to have them healed.

In all of them, the ulcers put on a much more healthy appearance, in less than three days after the operation ; and from that time, where no circumstance occurred to prevent it, went on healing like ulcers in healthy parts.

The veins of the limb in all of them became evidently smaller next day, in some of the cases in a

very remarkable degree ; and in the course of a week they were in general very much diminished in size.

In those cases that were attended with fever, inflammation, and general loss of health, all these effects were combined in the same case, and so very similar to what occurs in hospitals, from change of mode of life, and a more confined situation than the patient has been accustomed to, that they are partly to be attributed to these circumstances, and might have taken place, if no operation had been performed. It is natural at the same time to suppose, that, in irritable habits, applying a ligature round a large vein may so far affect the general system, as to dispose the body to be more readily affected by such causes.

That it may not appear that too much stress has been laid upon the effects which confinement and the air of an hospital have upon the constitution of many individuals, particularly after having undergone an operation, the following remarks are stated on that subject.

The injury the constitution receives from long confinement in an hospital is sufficiently understood ; but that it can suffer in so short a period as a week,

or a fortnight, will not be so readily believed, although instances of this kind are not unfrequently observed in practice. Were these effects confined solely to hospitals, they might be attributed altogether to bad air, much to the discredit of those charitable institutions; but this is by no means the case, as the same thing happens to private patients.

In three different instances of young women, who came out of the country to have operations performed in London, their health began to fall off at the end of the fortnight, and continued to decline till they were carried out into the air; and from the time of taking the first airing there was so evident an amendment, as to show that air alone was sufficient to bring about a recovery, which very soon took place, by daily going out in a carriage. Their lodgings were in the neighbourhood of Leicester-square, which cannot be considered as a very confined situation. After getting well, their general health did not suffer from remaining some weeks in the same lodgings; so that London could not be said to disagree with them. In conversations upon this subject with two of these patients, they mentioned, that they never could bear being confined to their room, even for a few days, without suffering from it.

If this ever happens in private practice, it must very frequently occur in all hospitals, even the most airy, both from the construction of the wards, and the situation of the buildings. Gardeners, farmers, and persons of that description, are soonest affected by it; and many instances have occurred of their losing their health in less than a fortnight in St. George's hospital, and getting well in a few days after being more in the air.

The foregoing cases were the only ones which I had met with at the time the first edition of this work was published, and they are now reprinted, with the same remarks annexed to them as in that edition.

Since that time, a great many similar cases have come under my observation; from these it is evident that the fever and inflammation, which occasionally take place, are direct consequences of the operation, and arise from the inflammation extending itself along the vein, sometimes in both directions, but more commonly towards the foot.

This being ascertained, it naturally leads me to point out in what manner these consequences may be obviated; this may be readily done by including the vein in two ligatures, distant about half an inch from each other, and cutting the vein across in the

intermediate space ; by this means the two ends of the divided vein are allowed to contract, and the inflammation does not extend itself beyond the ligatures.

If such inflammation was a constant attendant upon the operation of tying the vein in the more simple manner, this compound operation should undoubtedly be always preferred ; but as it only happens occasionally, and is ultimately productive of benefit to the patient, by obliterating a greater extent of the vein, and making him less liable to a recurrence of the disease, it becomes a question, whether there are not more circumstances in favour of the one than the other.

There are cases, in which exposing the vein for half an inch in extent would be a very difficult and severe operation ; and there are others, in which it may be done with the greatest ease ; there are constitutions, which would lead the surgeon to expect great irritability in the venal system ; others, in which there are no grounds for such a supposition ; it must therefore be left to the judgment of the surgeon to decide which mode is best adapted to the individual cases under his care ; but when the trunk of the vein at the part where it is to be taken up is

unusually large, and there are dilatations forming pouches immediately above and below that part, the vein should be always taken up by two ligatures, and divided in the intermediate space.

While this sheet was in the press, my friend Dr. Baillie informed me that Ambrose Parey had not only proposed the same operation, but performed it in exactly the same way. This author I had not before consulted, taking it for granted that Wiseman, who has professedly given the opinions of the ancients, had stated every thing material from their works.

Upon consulting Parey, I find the state of the veins just mentioned is that in which he recommends the operation; although the principle on which it was proposed is erroneous, he has undoubtedly the merit of pointing out the most simple mode of doing it, as well as of stating the advantages the ulcer on the lower part of the leg derives from the operation.

Had I been acquainted with his observations, I should certainly in the former edition have done

him that justice which is due to him, and which I now do, by inserting his remarks in the annexed note.*

* A varix is therefore cut or taken away, to intercept the passage of the blood flowing to an ulcer seated beneath, or else, lest that by the too great quantity of blood the vessel should be broken, and death be occasioned by a hæmorrhagic proceeding from thence. Now this is the manner of cutting it: let the patient lie upon his back on a bench or table, then make a ligature upon the leg in two places, the distance of some four fingers each from other, wherein the excision may be made, for so the vein will swell up and come more in sight, and besides you may also mark it with ink; then taking the skin up between your fingers, cut it longways, according as you have marked it; then free the bared vein from the adjacent bodies, and put thereunder a blunt pointed needle (lest you prick the vein) thred with a long double thread, and so bind it fast; and then let it be opened with a lancet in the middle under the ligature, just as you open a vein, and draw as much therehence as shall be fit: then straight make a ligature in the lower part of the forementioned vein, and then cut away as much of the said vein as is convenient between the ligatures, and so let the ends withdraw themselves into the flesh above and below; let these ligatures alone until such time as they fall away of themselves. The operation being performed, let an astringent medicine be applied to the wound and the neighbouring parts, neither must you stir the wound any more for the space of three days." A. Parey's Works, translated by Johnson, folio edition, page 319.

CHAPTER X.

THE EFFECTS OF LIGATURES ON VARICOSE VEINS
IN CASES OF ENLARGED VENA SAPHENA, VARI-
COCELE, AND PILES.

THE diseases which are considered in the present chapter do not belong to the general subject of the work, having no connection whatever with ulcers ; but as the treatment which is proposed was first suggested by attending to the effects of a varicose state of the veins upon ulcers, and the advantage derived to the ulcer from the trunk of the vein being included in a ligature ; it must be allowed that the following observations throw additional light on the beneficial effects of that operation.

ON TYING THE VENA SAPHENA, TO RENDER IT
LESS VARICOSE.

From the cases stated in the last chapter, it is evident that the branches of the vena saphena become diminished in size after the operation of tying the trunk, but this might be partly attributed to the effect of the operation upon the ulcer ; for improving the state of the ulcer would naturally remove a considerable degree of irritation from the veins of the leg.

That it does not depend upon that cause will be sufficiently proved by the following cases.

It is proper to remark that the only cases of this disease, in which great benefit is to be expected, are those in which the enlargement belongs to the branches of the vena saphena, major or anterior ; for where all the smaller branches upon the foot and leg are universally affected, the disease is too general to admit of relief from any one trunk being taken up.

When the branches of the posterior vena saphena are enlarged, it would be natural to expect the same degree of advantage from taking up the trunk in the ham, but that does not happen ; this vein has been taken up in several instances, but in none of them was the benefit sufficient to encourage a repetition of the operation in similar cases.

CASE I.

A. B. thirty-five years of age, a house-painter by trade, came to St. George's hospital, in the year 1794, to have advice for a weakness in his limbs, that rendered him unfit to follow his business, which required him to stand a great deal. Upon examining his legs, the veins were extremely large and varicose, equally so on both of them; there was no local disease of any kind, only pain and inability to stand long at a time. He was probably rendered more liable to this disease by the debilitating effects of lead.

From the success met with in the cases above related, it was thought he might receive material benefit from having the vena saphena taken up, it was therefore proposed to him that it should be tried in one leg; and if he found sufficient advantage from it, he could have it done on the other. To this he readily assented, and the operation was performed. In this case there was a considerable vein close to the vena saphena, which was included in the same ligature; the operation gave little pain, and was not followed

by any uneasiness : the ligature came away on the ninth day, but the wound did not heal ; he became faint and languid, had tremblings and cold sweats, with loss of appetite. These symptoms came on after being a fortnight in the house, and appeared to arise, in some measure, from the air of the hospital disagreeing with him ; that this was partly the cause, was confirmed by their being much relieved by getting him to walk out every day in the air, and by the internal use of Peruvian bark. As soon as he recovered, which was in about a month, he was advised to go into the country, and re-establish his general health, for the confinement in an hospital disagreed too much with his constitution, to admit of any thing being done at that time to the other leg ; and at some future period he might return, if the result of the operation encouraged him to have it repeated. No opportunity has occurred of seeing him since that time, so that no conclusions can be drawn from this case, beyond the immediate effects of the operation, which were favourable, the veins of the limb being rendered much smaller than they were before.

CASE II.

Thomas Gough, aged forty, came to St. George's hospital, and was admitted under my care, on account of weakness and swelling in the right leg, which prevented him from engaging in any employment of fatigue ; there was no ulcer upon the leg, but a constant degree of uneasiness, which was always increased by standing or walking. On examining the leg, the veins were much enlarged and varicose, and, what is unusual, there were two venal trunks passing up the thigh, one the vena saphena, the other a branch of nearly the same size, at some distance from it. It was proposed that both of them should be taken up : as, however, they were too much apart to be included in one operation, and too near to admit of both being taken up at the same time, without the inflammation extending over the intermediate space, it was determined to take them up separately, allowing the inflammation from the first operation to go off before the second was attempted. On July the 22d the

vena saphena was taken up : on the 26th the ligature was removed, and the wound had a very favourable appearance ; on the 29th the collateral branch was taken up ; and on August the 2d the ligature was removed. The leg was less swelled, and entirely free from pain, the veins appeared to be contracted in their size, and on the 5th he went into the country, one of the wounds being entirely healed, and the other nearly so.

CASE III.

John Mathews, aged twenty-six, a gentleman's servant, came into St. George's hospital on the 19th of April, 1770, on account of a varicose state of the veins of the right leg. He perceived, about ten years before, that the veins of the leg were larger than those of the other, and whenever he stood or sat long in the same posture, they swelled and became painful. Three years ago he received a cut upon the inner ankle, which divided a branch of the vena saphena; it bled profusely, and the hemorrhage returned several different times. Two years after that he bruised the same leg against a cartwheel, and hurt it so much as to be confined to his bed for seven weeks with a large ulcer, situated upon the inner side of the leg, a little above the ankle-joint; this ulcer healed under the use of a tight bandage, applied to the whole limb, from the toes to the knee.

The varicose state of the veins was now his only complaint, and it was so troublesome, as to induce him to come into the hospital, for the express pur-

pose of having the trunk of the vena saphena taken up, to relieve the branches situated upon the leg from the pressure of the column of blood, by which the dilatation was continuing to increase.

Upon examining the limb, the dilatation seemed to be confined to those branches which form the vena saphena ; but the trunk of this vein was deeper seated than common ; it did not lie loose under the skin, but imbedded in the fat and cellular membrane ; this was so much the case, that it became necessary to make compression upon the thigh, to render the vein more prominent. After dividing the skin, the vein was not exposed clearly to view, but it was now very distinctly felt. Under these circumstances I applied the forefinger of the left hand upon the vein, as a guide to the knife, and detached the fat and cellular membrane on one side with the point, so as to make room for the blunt needle to get readily behind the vein : in this way the ligature was passed round it, and tied in the same manner, as has been mentioned in the other cases. The operation was performed on the 22d of April ; on the 25th, which was the third day, upon removing the dressings and sticking plaster, there was an erysipelatous inflammation, extending a little way up the thigh and down the leg, in the course of the veins ; this induced me to cut out

the ligature, from the idea that this inflammation was brought on by it. He felt immediately easier ; on the fourth day the inflammation was much abated, and on the fifth it was quite gone off. He now mentioned that the pain he had been accustomed to feel in the veins of his leg was gone away. On the sixth day the wound was reduced to a small superficial ulcer, which healed up in a few days.

ON TYING THE SPERMATIC VEIN IN CASES OF
VARICOCELE.

Cases of varicocele are by no means uncommon, but they rarely increase to so great a size, as to lead the patient to the idea of having any operation performed for their relief.

They almost always happen in the left testicle and spermatic chord, in consequence of the returning blood from that testicle having a circuitous route to the vena cava; the spermatic vein terminating most commonly in the left emulgent vein, and when it does so, the angle at which they unite is nearly a right angle

From the following case it appears, that in some instances this disease becomes so distressing as to make the patient seek relief at any hazard, and the symptoms that occurred were such as would lead me, in any future operation of the same kind, to take up the vein in two places, and divide the intermediate portion, with a view to make the inflammation less liable to run along the vein, and consequently render the pain less severe.

CASE.

George York, aged twenty-eight, a tailor by trade, in the year 1788, while in North America, had a hydrocele, which was cured by means of a seton passed through the sac of the tunica vaginalis. It was three months before he recovered from the effects of the operation ; and three months after he got well, the testicles seemed to enlarge, and the scrotum became very uneasy when pressed. He came to England in the year 1795, and applied to several surgeons for relief, the scrotum being at that time so large, and the testicles so uneasy, that he could not follow his usual occupations. He was directed to live low, and take internal medicines of a cooling and purgative nature ; to apply the solution of sal ammoniac to the part, and to keep it suspended. He followed this plan for some weeks ; but, receiving no benefit, relinquished it.

His complaints preventing him from pursuing the only mode of life by which he could get a livelihood, which was going to sea as a ship-tailor, he was very

desirous of having something done for his recovery. He came to St. George's hospital, and consulted me how far any operation could be performed for his relief, as he was willing to submit to the loss of the testicle, rather than continue in his present state.

Upon examining the parts, the scrotum was found to be unusually thickened, and the veins of the left testicle to be so much enlarged, as to increase its bulk beyond what is considered as a large hydrocele. The veins were all convoluted, and moved readily on one another, and appeared to be the only cause of this increased size of the testicle. On the testicle of the right side there was an incipient hydrocele, containing about two ounces of water.

In this state of the left testicle little was to be expected from internal medicines, and the removal of it appeared to be a cruel operation. The patient could not be prevailed upon longer to go on with his complaint in its present state. He had before been told that the disease was an enlargement of the veins ; and had seen two patients of mine in the hospital, who had received considerable benefit in cases of varicose veins of the leg, by having the vena saphena taken up at the knee, and wanted to know if a similar operation could not be performed upon the veins of his testicle. The only answer

made to this question was, that I would not propose to him any such operation, having no knowledge of its effects ; at the same time believed there was so little danger in it, that if he chose to have it performed, I had no objection to comply with his desire, although I did not feel myself authorised to take it entirely upon myself. I begged he would not at that time come to any resolution, but turn it in his mind before he came to a determination.

He returned to the hospital some days after, and said he was resolved to have the veins taken up ; and the operation was performed on the 15th of March, 1796, in the following manner: I endeavoured to find the spermatic chord, and having done so, grasped it between my finger and thumb, and pushed forwards the surrounding veins, so as to make them press against the external skin of the scrotum : while the left hand was thus engaged, I divided the skin, without wounding the veins ; and the moment the incision was made, several convolutions were protruded between the lips of the wound, covered by a strong tendinous fascia, which confined them in their situation ; when that was cut through, they projected beyond the aperture ; it was necessary to divide this fascia a little more freely, to get readily behind this vein, which by its convolutions on itself formed a thick plexus. A

needle, the point of which had been rounded off, was then passed behind the convoluted vein, and inclosed it in a ligature.

The moment the ligature round the vein was drawn tight, a cold sweat came on, and he fainted away : in a few minutes he recovered, and was tolerably well. For the first three days nothing particular occurred, the wound had no unusual appearance. On the fourth day his tongue became white and dry, his pulse small and low, the beat not exceeding fifty in a minute ; these symptoms coming on unaccompanied with any change of the local appearances, led to the belief that they were not the effects of the operation, but the symptoms of a common fever ; and this was strongly corroborated by the circumstance of there being two or three patients in the hospital attacked in a similar way, independent of local injury. On the fifth the parts were very tender and uneasy, and put on a sphacelated appearance, but the fever had abated. Eighth day the ligature came away, and he was now so free from the fever as to take the bark. The abatement of fever and irritation immediately after the coming away of the ligature, is sufficient proof that they were brought on and kept up by the presence of the ligature. Twelfth day, the wound became very irritable, and could not bear the dressing ; the

parts were therefore fomented every hour. He took thirty drops of æther and tincture of opium, as often as was found necessary to take off the pain, which was very acute. On the sixteenth the sloughs were entirely separated from the wound, and it put on a healthy appearance ; and on the twenty-fourth day it became a superficial ulcer : and by the twenty-sixth was perfectly well. At the time the wound healed, the testicle and its vessels were diminished to one half of the size they had acquired before the operation.

He was kept in the hospital, and had the operation for the radical cure performed on the hydrocele of the tunica vaginalis of the other testicle. This was done by an injection of equal parts of wine and water, and succeeded perfectly. He then left the hospital, having continued there a month after he had got well of the operation for the varicose veins ; the parts remained in the same diminished state, not being at all affected by the operation for the hydrocele, although so near them.

On the 30th of November he returned to the hospital, with a view, he said, to have the testicle still more reduced, by having another vein taken up. From this I endeavoured to dissuade him, by pointing out the violence of the former symptoms ; but

the benefit he had received from the first operation had so strongly impressed him with a belief that another operation would complete the cure, that all the arguments urged in favour of his being satisfied with his present state were in vain. Finding he would be unhappy unless something more was done, and there being no apparent danger in taking up a large vein, which lay very superficially on the anterior part of the spermatic chord, no further objection was made to his wishes, and he was taken into the hospital for that purpose.

On the 2d of December this vein was taken up while the patient was in an erect posture, exactly in the manner described in the cases of the vena saphe-na. As soon as the ligature was passed behind the vein, the man fainted, but recovered upon being laid in an horizontal position.

As the immediate symptoms in the last operation had been very severe, with a view to make them less so in the present, the vein was not immediately tied, but left till the next day with a loose knot upon it; he had an opiate given him, but had no sleep in the night; he was however tolerably free from pain. Next day the ligature was tied as tight as the parts could bear. This did not produce any pain or distressing symptoms. On the fifth day from

the operation the ligature was removed, by dividing the noose with a pair of scissors, and the wound was treated as a superficial ulcer. The general bulk of the testicle was become much smaller, and the parts free from any degree of inflammation. On the thirteenth, on account of some very indecent conduct, he was discharged from the hospital by order of the Board, the wound being nearly healed.

I have since heard that he imprudently exposed himself in the very severe weather about Christmas, caught a violent cold, which fell upon his bowels, and carried him off.

ON TYING PILES SO AS TO PREVENT THE PAINFUL SYMPTOMS USUALLY PRODUCED BY THAT OPERATION.

PILES have their origin in a varicose state of the veins of the inferior part of the rectum and verge of the anus. There are some natural circumstances attending these vessels, which render them more liable than any other veins in the body to this disease : their trunks are within the cavity of the abdomen, and the inferior branches pass up between the lining of the intestine and the sphincter muscle, to bring back the blood from the verge of the anus. From these circumstances, when the contents of the lower bowels are in a solid form, the veins are compressed between them and the muscle during the time of their expulsion ; and on the other hand, when the lower bowels are much irritated, as in diarrhœa or dysentery, attended with tenesmus, although the contents are liquid, the action of the muscle is so violent as to compress the veins, and prevent the blood from passing freely through them.

From these causes piles are first brought on, and afterwards gradually increased.

Piles are of two kinds, internal and external : the internal are those formed within the anus, and only protruded at the time of going to stool ; the external, those that appear upon the verge of the anus, and never change their situation.

The internal ones project inwards into the cavity of the gut, like berries, and, in general, are two or three in number, most commonly three ; they are soft and loose in their texture in their easy state, but when inflamed are as turgid as a ripe grape, and when punctured, or when they burst, which sometimes happens, they bleed freely.

In cases of long standing, they change their nature and appearance ; their contents coagulate and become solid, their coats increase in thickness, and they resemble pendulous excrescent tumors in other situations in the body.

The internal piles are those which most generally require the attention of the surgeon ; and when once they have acquired a certain size, are almost always attended by external ones as a consequent disease. There are, however, some instances of external piles where there are no internal ones.

The modes of removing this disease in either of these situations are essentially the same ; these are either cutting off the projecting portions, in which the convolutions of the veins are contained, by a sharp instrument, or tying them by a ligature, so tight as to produce mortification in the part, which afterwards drops off.

The external piles very frequently have the blood coagulated in their cells, so that when they are cut off, the different coagula are seen projecting some way from the membrane which surrounds them.

The modes of treating the disease when within the reach of being cured, either by internal medicines or external application, is not immediately to our present purpose ; it is, however, highly proper that it should be mentioned in this place, that the disease does frequently admit of a considerable degree of palliation, and sometimes of a cure, by the internal use of Ward's paste, which has more power over these veins in making them contract, than any other medicine in general use.

The spices in Ward's paste seem to act directly upon the hæmorrhoidal vessels, as the balsam capivi does upon those of the urethra.

Removing piles by a cutting instrument is attended with considerable pain, but this is of short duration, and is so much less severe than that which takes place in removing them by a ligature, that where it can be done with safety it is to be preferred. In this way external piles may always be removed, since the degree of induration of their coverings, produced by constant exposure to external circumstances, makes them less liable to bleed, and any hæmorrhage that is brought on is within the reach of such applications as are capable of stopping it: but this is by no means the case with internal piles; their coats are thin, they are out of the reach of having styptic applications accurately and steadily applied to the bleeding orifice, and in some instances within my own knowledge, where they have been removed by the knife, the bleeding has been so great as to endanger the patient's life.

As external piles are most commonly the consequences of internal ones, and disappear when these are removed, it will never be proper to propose any operation for external piles, till the internal have been first destroyed, and a sufficient time has elapsed to ascertain that the others will not subside.

When internal piles have arrived at a considerable size, we are not warranted in cutting them off, on account of the bleeding, and have no other mode of removing them with safety but by means of the ligature.

The common mode of tying piles is, by passing a needle armed with a double ligature through the basis of the pile, and tying one ligature on each side, so tight as to make the pile itself become turgid, and afterwards mortify. The pain attending the immediate application of the ligature, and that which accompanies the inflammation it produces, exceeds any thing met with in the most severe surgical operation. It is so great, that many surgeons decline performing the operation; and patients, however much they suffer from the disease, are for the most part deterred from having recourse to so violent a means of obtaining relief.

The observations which have been made in the preceding part of this chapter upon tying veins appeared to me to apply to piles, as well as other veins in a varicose state; and the great sufferings which patients experienced, whose piles had been tied, seemed to arise from the distended state of the veins, the delicate texture of whose coats could not bear so great a degree of extension,

without suffering from inflammation, by which the sensibility was so much increased as to produce the most agonising pain.

This view of the subject led me to believe, that if the distension was prevented, by taking up the pile with a double ligature, and opening the intermediate portion of the enlarged veins, the pain would be less severe, and the operation exactly similar to that of taking up a vein in two places, and cutting through the portion between the ligatures, as has been already recommended, to prevent the inflammation extending itself along the vein.

The principal objection which presented itself to this mode of tying piles was, the possibility of the part being withdrawn through the noose, by the natural actions of the intestine, as there was no increased bulk beyond the ligatures; this, however, is not found to happen in practice.

The first time this mode of performing the operation was adopted, it was done in the following manner: the internal piles were made to protrude externally, so as to be exposed to view, and a needle with a double ligature was passed through the centre of the basis of the pile, the needle was immediately cut off, and one of the ligatures was made

to embrace one half of the pile, and then tied with a single knot, tolerably tight, so as to make that portion turgid ; the top of the pile was then removed by the scissors, and the knot drawn as tight as possible, and then made secure by a second knot ; the other portion of the pile was treated in the same way. Where there are several large piles, they are all to be secured in a similar manner, after having their cavities laid open, and their contents evacuated ; the pain from the operation is by no means severe, it lasts for an hour or two, and then begins to subside, nor does it afterwards return with any degree of violence ; on the ninth day the ligatures are separated, and the patient finds himself free from complaint : upon examining the part, the whole of the piles are found to have been completely removed. The result of this operation was so favourable, as to encourage me to pursue the same mode of treatment in other cases, whenever they occurred to me.

In four different instances, two of them in private practice, and two in St. George's hospital, the patients have been operated on in this way, and in all of them the symptoms have been unusually mild, and the cure completely effected.

There is no better mode of giving an idea of the difference in violence of the symptoms in the

common mode of tying piles, and that which is here recommended, than by stating, that in the usual mode the patient suffers, in consequence of the operation, all the same symptoms as those of a violent attack of the piles, and these are kept up for five, six, or seven days, and in a very aggravated degree ; in the present mode, the symptoms scarcely exceed those brought on by a moderate attack of piles, and do not continue with that degree of severity for more than a few hours, and then gradually subside.

These four instances appear to me sufficient to show, that in this mode the piles can be completely removed, and that the symptoms are unusually mild. From what has been already stated upon the subject of tying veins in general, there could be no doubt of the advantages that would attend taking off the tension from the coats of the vein, and the only thing necessary to be known is, whether this can be done, and at the same time the pile be so secured as to answer the purpose of removing the disease ; the present facts appear to establish this point, which is all that is necessary to recommend the present mode of performing the operation.



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